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UNIVERSITY OF TORONTO



REPORT OF THE DEAN
OF THE
FACULTY OF MEDICINE

Session 1969-1970

Printed at University of Toronto Press
Toronto, Canada, 1971

Report of the Dean of the Faculty of Medicine



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THE DEAN OF THE FACULTY OF MEDICINE

Undoubtedly the most pressing problem facing the Faculty of Medicine of the University is to redefine its relationship with its associated teaching hospitals. Present university-hospital agreements are totally inadequate to meet the requirements imposed by the great changes in financing of hospitals and their professional staff by the introduction of Government insurance programmes and the introduction of formula-financing for universities. Governmental requirements for co-ordinated capital financing and integration of major service programmes add further strains on this relationship.

The "Independent Planning Committee," an ad hoc arrangement to define the University's needs for accommodation and facilities in the hospitals, recommended a more permanent organization to implement and ensure the continuous co-ordination of the educational needs of the University with the community service needs provided by the teaching hospitals. Such an organization is urgently needed but can only be brought into being by the legally constituted authorities, namely, the Board of Governors for the University and the Trustees of the Hospitals.

At the moment the Trustees of the hospitals are fully aware of their dependence on the University for approval of certain capital funds and also are alive to the fact that the availability of operating funds to support specialized professional staff has major implications in their ability to meet community needs for services. The University Board, on the other hand, although confronted with a large budget for the Medical School which is difficult to relate directly to academic activity, appears hesitant to accept responsibility in this field. At a time when the validity of the Board's authority appears to be in question there is, to my mind, a very great danger that the educational programme and needs of the Medical School will be dictated by the professional demands of hospitals rather than by the University. I am strongly of the opinion the Board with the advice of its senior educators in the Medical Health Sciences faculties *must* give constant attention to the University's role in the teaching hospitals if its position is to be appropriately maintained. The Vice-President, the Dean and their advisers are powerless without such backing by the Board. This in no way implies a state of constant confrontation between the hospitals and the University. It is apparent, however, that the University and the hospitals which serve its educational needs must work in much closer relation to one another than has been the case in the past. Unless each authority accepts its share of the responsibility both parts of the programme of education and patient care, which are inextricably intertwined, will suffer. In consequence both the reputation of the school and the service rendered the public will deteriorate. *The quality of medical care available to the public can only be guaranteed if the quality of medical education is maintained at the highest possible level. The University has an inescapable responsibility to provide it.*

Although it is now three years since the University was asked to produce an overall plan for its educational needs in teaching hospitals no programme acceptable to the Hospital Commission has yet been adopted. Lack of clear direction by Government agencies must share a degree of the responsibility for some of the delays in implementing urgently required renovations in our teaching hospitals.

The introduction of the new curriculum in the past year has further highlighted a number of problems in the field of university-hospital relationships. Despite many vexing and complex issues the introduction of the new curriculum has met with general approval and in some quarters even with enthusiasm. It will be two or three years before any real assessment of its advantages or shortcomings can be made.

Because the curriculum, coupled with increased student enrolment, makes greatly

increased demands on the energies of the staff at a time when there are real constrictions on the budget a review of faculty activity and the division of effort between undergraduate and postgraduate teaching, research, representation on national and international bodies, etc., will require some revision of faculty objectives. In spite of these difficulties the first full year in our new Medical Sciences Building has been a tonic to counter other frustrations.

We are developing our service facilities as funds permit. The passage of Bill 194 by the Provincial Legislature regarding acquisition and use of experimental animals has placed increased responsibility on the Department of Laboratory Animals. The installation of television equipment and other instructional media services is now almost complete. It is hoped that the creation of the Instructional Media Centre by the University will make these facilities more fully productive than they would be if financed by the Faculty alone. Similarly, the Computer Services and Functional Planning Unit which are shortly coming into operation should greatly assist our activities.

There have been a number of changes in staff. We are pleased to welcome Dr. Charles Hollenberg as our new Chairman in the Department of Medicine, Dr. John Harkins as Chairman of the Department of Obstetrics and Gynaecology, Dr. F. Fallis as Chairman of the Department of Family and Community Medicine, Dr. G.R. Williams as Chairman of the Department of Biochemistry and Dr. N. Hinton as Chairman of the Department of Bacteriology.

A word of sincere appreciation is also extended to the former chairmen of these departments who in most instances are returning to the professorial ranks.

Professor Wightman has become Associate Dean of the Postgraduate Division. Professor Paul of Obstetrics, Professor Connell of Biochemistry and Professor Perkin of Family and Community Medicine will remain with their departments. A special word of appreciation is extended to Dr. Franklin who has been Acting Head of Bacteriology during a long period of uncertainty regarding the future of this department.

The contribution to various fields of medicine by members of our staff has been recognized by the honours received. In addition to those listed in the Honours section we record the following:— Dr. J.W.A. Duckworth — President of the Central Ontario Branch of the Defense Medical Association of Canada; Dr. I.B.R. Duncan — Vice-President of the Canadian Society of Microbiologists, Chairman of the Specialty Committee in Medical Microbiology of the Royal College of Physicians & Surgeons of Canada; Dr. R.F. Badgley — Associate Editor, *Journal of Health and Social Behaviour*; Professor M.J. Kilner — Member, Second and Third Conferences on Behavioural Science and Medical Education (by invitation of U.S. Government, Department of Health, Education and Welfare, National Institutes of Health), Boiling Springs, Pennsylvania, May 1970; Dr. F.B. Fallis — Awarded Fellowship in College of Family Physicians of Canada, October 1969; Chairman of The Committee on Community Health of The Council of Health of the Province of Ontario; Dr. N.N. Levinne — Awarded Fellowship in College of Family Physicians of Canada, October 1969; Dr. R.L. Perkin — Awarded Fellowship in College of Family Physicians of Canada, March 1970; Chairman of The National Committee on Undergraduate Medical Education, College of Family Physicians of Canada; Dr. P. Roberts — President of The North Toronto Medical Society; Professor Louis Siminovich — Elected to the Research Advisory Group of the National Cancer Institute of Canada; Dr. M.M. Fisher — Member of the New York Academy of Sciences and the Canadian Association of Gastroenterology; Dr. M.D. Johnson — Visiting Lecturer, University of Honduras, Tegucigalpa, Honduras; Dr. M.L. Bunker — Elected Vice-President and Director-at-large of the Canadian Cancer Society, Ontario Division; Dr. R.G.C. Kelly, President of the International Regional Congress of Ophthalmology held at Yellowknife, N.W.T.; Dr. G.A. Thompson — Medical Director, Eye Bank of Canada (Ontario Division), and a National Consultant Ophthalmologist for the Canadian National Institute for the Blind; Dr. B. Fearon —

Elected member of the Board of the Chevalier Jackson Foundation for research in laryngology; Elected Thesis Committee Chairman, American Broncho-Esophagological Association 1969-70; Dr. A.D. Jones – Mead Johnson Fellowship by the Canadian Paediatric Society; Dr. M.J. Lynch – Chairman of the Section of Clinical Pathology of the Ontario Medical Association; Dr. A. Katz – Served as Chairman of the Section of Pathology of the Academy of Medicine; Dr. B. Cruickshank – Served as Secretary of the Section of Pathology of the Academy of Medicine; Dr. M.J. Phillips – Appointed Programme Chairman for the Canadian and Ontario Associations of Pathologists; Dr. P.H. Pinkerton – Awarded the Carveth Junior Scientific Award for 1969; Dr. J.W. Pearce – Chairman, Science Policy Committee of Can. Fed. Biol. Societies and Member of Council, SCITEC; Dr. K.G. Gray – Chairman, Committee on Definition of Death, Canadian Medical Association; Dr. P.A. Christie – Acting Editor, *Canadian Psychiatric Association Journal*; Dr. H. Moldofsky – McLaughlin Travelling Fellowship 1970-1971; Dr. L.P. Solursh – Chairman, Special Committee on the Non-Medical Use of Drugs, Canadian Medical Association; Dr. D.C.F. Harwood-Nash – Visiting Professor in Radiology to the Department of Radiology, University of California, Los Angeles; Invited as a Faculty member to the Second Pediatric Neuroradiological Symposium, Northwestern University, Chicago; Dr. B.J. Shapiro – Invited to be guest Editor of the *University of Toronto Medical Journal*, Radiology issue; Dr. R.J. Baird – Lecturer, International Cardiovascular Society, Buenos Aires; Dr. W.R. Drucker – Guest Lectureships – Foothills Hospital, University of Calgary, Alberta; St. Joseph's Hospital, McMaster University, Hamilton, Ontario; Visiting Professorships – Louisiana State University, Columbia University, Welsh National School of Medicine, Middlesex Hospital Medical School; Dr. R.O. Heimbecker – Visiting Professor: University of Miami, University of Newcastle-upon-Tyne, University of Utrecht; Guest Lecturer: Royal Infirmary – Edinburgh, Queen's University Aesculapian Club, Southern General Hospital, Glasgow; Dr. A.R. Hudson – Special Lecturer, Toronto Academy of Medicine; Dr. I. Macnab – Visiting Professor: New Zealand and Australia, Tulane University, Hospital for Special Surgery – New York, Ankara, University of Florida; Dr. J.F. Murray – Guest Lecturer, University of British Columbia and B.C. Workmen's Compensation Board; Dr. F.G. Pearson – Visiting Professor: University of California at Los Angeles; Guest Lecturer, American College of Chest Physicians and the Colorado Trudeau Society 9th Mid-winter Chest Conference; Dr. C.J. Robson – Visiting Professor: Dalhousie University, Halifax; Guest Lecturer: New England Section of American Urological Association – Puerto Rico, New York Section of American Urological Association – New York City; Dr. R.B. Salter – Visiting Professor: University of Buenos Aires, University of Colombia at Bogotá, Queen's University at Kingston; Guest Lecturer: Pan Pacific Surgical Association – Honolulu, National Defence Medical Center – Ottawa, Hospital for Special Surgery – New York City; Dr. J. Schatzker – Guest Lecturer, Tulane University; Dr. R.R. Tasker – Guest Lecturer, Queen's University Neurology Seminar.

Visitors

During the academic session many prominent physicians and scientists visited the Faculty. These included:

Department of Anaesthesia: Dr. James Freeman of the Research Department of Anaesthetics of the Royal College of Surgeons of England who gave the Eleventh Doctor Harry Shields Lecture; Dr. David M. Little, Jr., Hartford Hospital, Hartford, Connecticut; Professor J.P. Payne, Research Professor of Anaesthetics, The Royal College of Surgeons of England; Dr. A.R. Hunter, University of Manchester.

Department of Art as Applied to Medicine: Keith Scott; William Stenstrom, University of Texas; Judith Smith, Royal Victoria Hospital, Montreal.

Banting & Best Department of Medical Research: Dr. Alan Wu, University of Wisconsin; Dr. G.R. Wyatt, Yale University; Dr. N.C. Mishra, Rockefeller University; Dr. J.R. Williamson, Johnson Research Foundation, University of Pennsylvania; Dr. M.N. Berry, University of California; Dr. P.R. Galsworthy, Princeton University; Dr. A. Fessler, Weizmann Institute of Science, Rehovoth, Israel; Dr. R. Levine, New York Medical College; Dr. A. Tzagoloff, Health Research Institute of the City of New York; Dr. J.R. Tata, University of California, Berkeley; Dr. P.J. Randle, University of Bristol; Dr. K.L. Roy, Yale University; Dr. M.H. Makman, Albert Einstein College of Medicine of Yeshiva University; Dr. D. Suzuki, University of British Columbia.

Division of Behavioural Science: Dr. Stanley Best, University of Michigan; Neil E. Collishaw, M.A., Research Associate, Association of Canadian Medical Colleges, Ottawa; Anne Crichton, Ph.D., Department of Health Care and Epidemiology, University of British Columbia; Dr. Raul Derticos Torrado, Dean, Faculdade de Medicina, Universidade de Havana, Cuba; Dr. Halmend C. Dyer, University of the West Indies, Jamaica; Dr. G.P. Evans, Medical Consultant, Health Manpower Resources, Department of National Health and Welfare, Ottawa; Dr. John Hay, McMaster University; Dr. Conrad Harris, Lancashire; Dr. Henry P. Kedward, Memorial University of Newfoundland; Dr. L. Levine, Brooklin Medical Centre, Brooklin, Ontario; Alexander E. Macleod, D.D.S., Dalhousie University; Professor Ian MacWhinney, University of Western Ontario; Professor Hans O. Mauksch, University of Missouri; Dr. John McMullen, Amersham, England; Dr. Affonso Renato Meira, Universidade de Brasilia; Dr. John Owen, University of Saskatchewan; Dr. Alexander D. Robertson, Program of Human Resources Development, Pan American Health Organization, Barbados; Professor Eilon Shiloh, University of Pittsburgh; Dr. N. Taquechel, Director, Departamento de Medicina, Escuela de Medicina, Universidade de Havana, Cuba; Dr. Alan Torrie, Lake of the Woods Clinic, Kenora; Dr. Samuel Wolfe, Meharry Medical College, Nashville.

Department of Medicine: Dr. J.W. Adamson, Seattle; Dr. R. Agnew, Saskatoon; Dr. G.B. Ansell, Birmingham; Dr. D.F. Austen, Boston; Dr. M. Bouvier, Lyons; Dr. J. Burdine, Houston, Texas; Dr. Y. Clermont, Montreal; Dr. E. Diener, Victoria, Australia; Dr. F. Dixon, LaJolla, California; Dr. B. Gallier, Brisbane, Australia; Dr. R.A. Gatter, Abington, Pennsylvania; Dr. F.C. Greenwood, Hawaii; Dr. T.C. Hall, Rochester, New York; Dr. J. Henderson and Dr. A. Khaliq, Edmonton; Dr. M. Legrain, France; Dr. E. LeJeune, Lyons; Dr. Clara Lowy, London; Dr. J.A. Mathews, London; Dr. Wolfgang Mempel, Munich; Dr. S. Meyerowitz, Rochester, New York; Dr. K.D. Muirden and Dr. W.J. Moon, Melbourne; Dr. A. Mowat, Oxford; Dr. J. Mulder, Malmo, Sweden; Dr. Welwyn Nelson, University of Sydney; Dr. Jesus Diaz Olivera, Mexico City; Dr. R. Pannier, Ghent, Belgium; Dr. M. Saffran, Montreal; Dr. P. Sonksen, Boston; Dr. P. Sweterlitsch and Dr. B. Twardy, Abington, Pennsylvania; Dr. H. Wagner, Johns Hopkins University.

Department of Ophthalmology: Dr. Wendell Hughes, New York; Dr. S. Richter, Humboldt-University in East Berlin; Dr. J. Agarwal, Madras; Dr. Henry Wyatt, St. Paul's Eye Hospital, Liverpool; Dr. G. Lugossy, Budapest; Dr. E.S. Perkins, Institute of Ophthalmology in London.

Department of Otolaryngology: Mrs. Caroline M. Sim, Consultant, E.N.T. Surgeon, King's College Hospital, London; Dr. Georg Von Bekesy, University of Hawaii; Dr. D. Garfield Davies, Middlesex Hospital, London; Dr. R.P. Gannon, M.R.C. Visiting Professor, Institute of Otolaryngology Royal Victoria Hospital, Montreal; Dr. Gunnar Ashan, Regional and University Hospital, Sweden; Dr. Von Ilberg, University of Frankfurt.

Department of Paediatrics: Dr. Hermien E. Zoethout and Miss Van de Stadt, Sophia Children's Hospital, Rotterdam; Dr. J.S. Robinson, Sevenoaks Hospital, Kent; Dr. H.C. Dyer, University of the West Indies; Dr. Allan Drash, Children's Hospital, Pittsburgh; Dr. William McCoy, Children's Hospital, Adelaide, Australia; Dr. John Tanner, Professor of Child Health and Growth, London; Dr. Richard Talamo, Massachusetts General Hospital, Boston; Dr. Henry Nadler, Children's Memorial Hospital, Chicago; Dr. Samuel L. Katz, Duke University Medical Center; Dr. James W. Sayre, University of Rochester School of Medicine; Dr. Robert Good, American Legion Memorial Research Professor, Variety Club Heart Hospital, Minneapolis; Dr. W. Hugh Missildine, Children's Mental Health Center, Columbus, Ohio; Dr. David Lawson, Queen Mary's Hospital for Children, Carshalton, Surrey; Dr. Geoffrey S. Dawes, Nuffield Institute for Medical Research, Oxford; Dr. Robert E. Cooke, Johns Hopkins Hospital; Dr. James E. Breheny, Mercy Maternity Hospital, Melbourne; Dr. John Court, Diabetic Clinic, Royal Children's Hospital, Melbourne.

Department of Pathology: Dr. E.J.G. Olsen, Royal Postgraduate Hospital, London; Dr. Alvin Volkman and Dr. Douglas D. McGregor, Trudeau Institute, Saranac Lake, N.Y.; Professor E. Boyland, Chester Beatty Research Institute, London; Professor Frank Magary, University of Sydney; Professor Lardner, University of Hamburg; Dr. A. Sharp, University of Oxford; Professor D. Williams, Welsh National School of Medicine, Cardiff; Dr. M. Kaplan, Metropolitan General Hospital, Case Western Reserve University.

Department of Pathological Chemistry: Dr. D.H. Curnow, University of Western Australia; Dr. M. Jutisz, Collège de France; Dr. J. Orloff, National Institutes of Health, U.S.A.; Dr. R.M. Epand, University of Guelph; Dr. C.C. Liew, Rockefeller University; Dr. R.P. Cook, University of Dundee; Dr. S. Liao, University of Chicago.

Department of Pharmacology: Dr. J.R. Gillette, National Heart Institute, Bethesda, Maryland; Dr. J.F. Hoffman, Yale University School of Medicine; Dr. S. Brimijoin, Department of Health, Education and Welfare, National Institute of Mental Health, Bethesda; Dr. F.C. MacIntosh, McGill University; Dr. M. Feinstein, University of Connecticut Health Center; Dr. C.M. Smith, State University of New York at Buffalo; Dr. D. de Wied, Rudolf Magnus Institute for Pharmacology, University of Utrecht.

Department of Physiology: Dr. J. Murphy, State University of New York at Buffalo; Dr. Stevan Milkovic, University of Zagreb; Dr. H. Grundfest, College of Physicians and Surgeons of Columbia University; Dr. H. McLennan, University of British Columbia; Dr. P.J. Randle, University of Bristol; Dr. B.J. Sessle, National Institutes of Health, Bethesda; Dr. W.J.H. Nauta, Massachusetts Institute of Technology; Dr. P. Gloor, Montreal Neurological Institute; Dr. G. Melville Jones, McGill University; Dr. Georg von Békésy, University of Hawaii; Dr. N. Altszuler, New York University Medical Center.

Department of Radiology: Dr. F. Garrett Anderson, Cheshire, England; Dr. K. Thummoon, Pzaset Neuro. Hospital and Institute, Bangkok; Dr. M. Viamonte, Jr., University of Miami; Dr. B. Kaufman, Case-Western Reserve University; Dr. John Hodson, Memorial University; Dr. Arthur Clemmett, St. Vincent's Hospital, New York; Dr. John Campbell, Indiana University; Dr. John Kirkpatrick, Children's Hospital, Philadelphia; Dr. K. Sakurai, Yamaguchi University, Ube, Japan; Dr. Joseph W. Leverenz, American Cancer Society, Washington, D.C.; Dr. W.B. Dawson, Clatterbridge Hospital, Liverpool; Mr. W.I. Campion, A.E. Lunt, Limited, Liverpool; Miss Mary Holthouse, Matron, Royal Marsden Hospital, Sutton, England; Patricia M. Turnbull, Charing Cross Hospital, London; Dr. Antonio de Padua

Bertelli, São Paulo; Dr. Jefferson J. Vorzimer, Beth Israel Hospital, New York City; Dr. David S. Scotch, New York University School of Medicine; Dr. Bruce Kynaston, Queensland Radium Institute, Brisbane; Dr. Gunther Ehlers, Roswell Park Memorial Institute, Buffalo; Dr. Archie Fine, University of Cincinnati; Dr. Brusori, Cuneo Hospital, Italy; Dr. Roberto Algranati, Roswell Park Memorial Institute, Buffalo; Dr. Zarabini, Iurea, Italy; Dr. W.J. Moon, Peter MacCallum Clinic, Royal Melbourne Hospital; Dr. Lois Bingham Butler, Arlington, Virginia; Dr. Antony M. Goldstein, Christchurch Hospital, New Zealand; Dr. V. Moser, Linz, Germany; Dr. M. Lederman, Royal Marsden Hospital, London; Dr. Robert G. Whiston, Saint John, New Brunswick; Dr. W.B. Fleming, Peter MacCallum Clinic, Melbourne; Dr. Torsten Landberg, University Hospital, Lund, Sweden; Dr. J.D. Abbott, Radiation Protection Division, Department of National Health and Welfare, Ottawa; Dr. Rossall Sealy, Groote Schuur Hospital, Capetown; Dr. W. Evers, University Hospital of Nijmegen; Dr. M.R.M. van de Voort, The Netherlands; Dr. Jorgan Rygard, Copenhagen; Dr. Victor Levison, North Middlesex Hospital, London; Dr. D.A. Lundberg, Neutron Division, Elliott Automation, London; Dr. E. Scherer, Clinic für Radiotherapy der Ruhr-Universität, Essen; Dr. C.A. Joslin, Velindre Hospital, Whitchurch, Cardiff; Dr. R. Nissen-Meyer, Aker Hospital, Oslo; Dr. T.B. Brewin, Western Infirmary, Glasgow; Dr. R. Vera, Caracas; Dr. Klaus Mayer, Memorial Hospital for Cancer and Allied Diseases, New York City; Dr. F.T. Brayer, The Georgetown University Medical Center, Washington, D.C.; Dr. Sydney Curwen, Radiotherapy Centre, Bristol; Professor Vukio Ishibashi, Dr. Kazataka Ashitawa, and Dr. Kiichi Inoue, Tokyo; Dr. H. Brenner, England; Mr. J.L. Hayward, Guy's Hospital, London; Professor Ko Sakurai, Yamaguchi University School of Medicine, Ube, Japan.

Department of Surgery: Dr. Fred L. Clement, Kalamazoo, Michigan; Dr. Fred H. Wigmore, Moose Jaw; Professor Milton T. Edgerton, Johns Hopkins University; Dr. Jacob Fine, Harvard Medical School, delivered the Balfour Lecture; Professor A.P.M. Forrest, Cardiff, delivered the first Bruce Lectureship; Professor Lloyd McLean; Dr. Lee Ramsay Straub, New York City, delivered the Kennedy Lecture; Mr. H.R.H. Belsey, Frenchay Hospital, Bristol; Professor Maurice R. Ewing, University of Melbourne; Mr. Leslie Hughes, University of Queensland; Professor Ivan B.A. Johnston, University of Newcastle-upon-Tyne; Mr. Adrian Marston, Middlesex Hospital, London; Mr. A.C. McEachin, Royal Australasian College of Surgeons; Dr. Basil Morson, St. Mark's Hospital, London; Professor G.B. Ong, University of Hong Kong; Professor Kurt Stucke, Germany; Dr. H.O. Thomas, Provost of the College of Medicine, University of Lagos; Professor James McKay Watts, Prince Henry's Hospital, Monash University; Mr. J.L. Wosornu, Ghana Medical School.

Institute of Medical Science: Dr. J.W. Adamson, Veterans' Administration Hospital, Seattle; Dr. E. Diener, Walter and Eliza Hall Institute of Medical Research, Melbourne; Dr. A. Feinstein, Yale University.

I should like to thank all those who by their donations have so generously supported our fellowship, scholarship and research programmes.

Research

Abbot Laboratories Limited; Alcoholism and Drug Addiction Foundation; American Heart Association; American Medical Association; Astra Pharmaceuticals of Canada; The Atkinson Charitable Foundation; Ayerst Laboratories; Banting Research Foundation; Beck Charitable Foundation; Charles H. Best Foundation; J.P. Bickell Foundation; J.W. Billes Estate; Bongard, Leslie and Company Limited; Stella Buckingham Fund; N.B. Brennan Estate; Canadian Arthritis and Rheumatism Society; Canadian Diabetic Association; Canadian Foundation for Advancement of Therapeutics; Canadian Heart Foundation; Canadian Life Insurance Association; Canada

Permanent Trust; Athol Cherry Estate; J. Clemens Estate; Cleveland Diabetes Fund; The Commonwealth Fund; Charlie Conacher Fund; the Connaught Medical Research Laboratories; J.M. Connell; The James H. Cummings Foundation; Deafness Research Foundation; The Defence Research Board; Denison Mines; Department of Health (Provincial); Department of National Health and Welfare; Donner Canadian Foundation; Eaton Endowment Account; T. Foster Estate; J. Fox Estate; P.R. Gardiner Foundation; F.C. Gray Estate; Hoechst Pharmaceuticals; Liza Horne Estate; I.G. Ingle Estate; Insulin Trust Fund; M.B. Kerbel Ophth. Foundation; G.C. Leitch Estate; Eli Lilly; R. Samuel McLaughlin Foundation; McNeill Laboratories Canada Limited; John and Mary Markle Foundation; Medical Research Council of Canada; T.J. Meek Estate; Multiple Sclerosis Society; Muscular Dystrophy Association of Canada; National Cancer Institute; National Research Council of Canada; National Health and Welfare Fitness and Amateur Sport; Ontario Cancer Treatment and Research Foundation; Ontario Geriatric Society; Ontario Heart Foundation; Ontario Hospital Services Commission (Eye Bank); Ontario Mental Health Association; Ontario Tuberculosis Association (Ontario Thoracic Society); Playfair Foundation; Rehabilitation Fund for the Disabled; Eliza J. Robertson Estate; Stephen B. Roman Foundation; B.E. Roney Estate; The Selkirk Fund; I.E. Smythe Fund; Stapells Fund; M. Treneman Estate; u.s. National Institutes of Health; Upjohn Company; Mona Willinsky Memorial Fund; Workmen's Compensation Board.

Finally, I should like to extend a word of appreciation to our students who have taken an increasingly active part in faculty activities in a most constructive and responsible manner.

A.L. CHUTE

REPORT ON REGISTRATION, SESSION 1970-1971

First Medical Year	206
Second Medical Year	201
Third Medical Year	187
Fourth Medical Year	184
Special Student	1
Art as Applied to Medicine	13
Diploma in Medical Radiology	46
Diploma in Psychiatry	77
Diploma in Anaesthesia	39
Diploma in Clinical Chemistry	3
Other Postgraduate Students	938
Physical and Occupational Therapy	289
Speech Pathology and Audiology	30
Student Teachers	2
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	2,216

FELLOWSHIPS, SCHOLARSHIPS, MEDALS AND PRIZES

GRADUATE

Ursula Bangs I.O.D.E. Scholarship	G. Webb, B.Sc., M.D., C.M.
Graham Campbell Prize	J.M. Frederickson, M.D., F.R.C.S.(C)
W.P. Caven Memorial Fellowship	H. Mori, M.D., D.M.S.C.
Elizabeth Arbuthnot Dyson Fellowship	J. Glasgow, B.Sc., M.B., B.Ch., B.A.O., M.R.C.P., D.C.H.
William Goldie Prize	E.D. Wigle, M.D., F.R.C.P.(C), F.A.C.P.
Arthur F. Haasz Fellowship	A.R. Guansing, M.D.
R.I. Harris Award	R. Galway, B.A., M.D.
Stuart Alan Hoffman Memorial Prize	Mrs. B.J. Cadeau, B.Sc., M.Sc.
Arch Hutchison Fellowship	J.K. McConnon, M.B., Ch.B. F.R.C.P.(C)

Frances Esther Hutchinson Fellowship	A.R. Guansing, M.D.
Inez Gwendolyn Inglee (Research Grants)	N. Camerman, B.Sc.(Hon.), Ph.D. Miss Dianne Nussey, B.Sc.(Hon.)
Alexander McPhedran Research Fellowship	J.K. McConnon, M.B., Ch.B., F.R.C.P.(C)
Minister of Health Gold Medal	D.J. Henderson, M.D., M.P.H., F.R.C.P.(C), D. Psych.
James H. Richardson Research Fellowship in Anatomy (69-70)	A. Roberts, B.A., M.A., M.D.
Anna Bradbury Springer Award	A. Robinson, M.D., M.R.C.S.(Lond.), D.C.H.(Eng.), M.R.C.P.(Lond.)
Edward Christie Stevens Fellowship	J. Brebner, M.D.
John Alexander Stewart Fellowships	D.H. Osmond, B.S.A., M.S.A., Ph.D. J.K. McConnon, M.B., Ch.B., F.R.C.P.(C) K.S. Desai, B.S., M.N.S., Ph.D.

UNDERGRADUATE

Fourth Medical Year

Cody Gold Medal	S. Greenberg
Cody Silver Medal	Miss N.H. McKee
Cody Silver Medal	E.W.T. Turgeon
Dr. Benjamin W. Appleton Prize in Psychiatry	Miss F.A. Shepherd
J.P. Boley Prize in Ophthalmology	G. Schneider
Louis Browner Memorial Scholarship	H. Krieger
Butterworth Prize	G.L. Kirsh
Irving Heward Cameron Undergraduate Scholarship	A.O. Davies
Kathleen Chambers Memorial Award	Miss F.A. Shepherd
Chappell Prize in Clinical Medicine	G.C.P. Ebers
Dr. Jacob Goldstein Scholarship	S. Greenberg
R.I. Harris Undergraduate Award	R.W. Ziedenberg
Hendry Memorial Scholarship	E.W.T. Turgeon
Issei Scholarship in Medicine and Surgery	P.E. Freeman
Dr. Louis Kagan Memorial Award	G. Schneider
Medical Alumni Association Scholarship	Miss N.H. McKee
Ellen Mickle Fellowship	S. Greenberg
Ontario Medical Association Prize in Preventive Medicine	J.I.O. Wohlgelernter
Dr. Roy Simpson Scholarship in Paediatrics	S. Greenberg G.C.P. Ebers
Starkman Memorial Scholarship in Medicine	H. Krieger

Aeq.

Third Medical Year

Bristol Laboratories of Canada Prize	R.D. Panabaker
Dr. F.J. Colling Scholarships (renewals)	S. Hafner R.N. McKenzie E. Magi L. Refling G.D. Schachter
Franckel Memorial Award	C. Shustik
Charles E. Frosst Medical Scholarship	Miss J.E. Haglund
J.F. Hartz Company Prize in Ophthalmology	J.A. Sherkey
J.F. Hartz Company Prize in Otolaryngology	S. Silverberg
Frank W. Horner Gold Medal	D.J. McNeely
Dr. and Mrs. M.A. Pollock Award	Mrs. M.A. Kelly
Saddington Medal in Pathology	C. Shustik
Starkman Memorial Prize in Pharmacology and Therapeutics	D.J. McNeely
Dr. Mitchell Kohan Scholarship	C. Shustik
Samuel J. Streight, O.B.E., M.D., Scholarship in Internal Medicine	C. Shustik
Dr. C.S. Wainwright Memorial Scholarships (renewals)	E.L. Book

	J.R.B. Bristowe
	Miss J.E. Haglund
	R.E. Hibbard
Walter F. Watkins Scholarships	S. Silverberg
	S.D. Levinson
	Miss K.M. Tusiewicz
	N.C. Colman
	R.D. Panabaker
	H.J. Abrams

Second Medical Year

Dr. F.J. Colling Scholarships	J.C. Gustaffson
	J.S. Lovering
	J. Tokaruk
	L. Robicsek
	W.J. Peters
	Miss S.J. Weckman
John Copp Bursary	P.A. Adamson
Posluns Brothers Scholarship	L. Eason
Dr. C.S. Wainwright Memorial Scholarships	
(renewals)	Miss P.A. Clifford
	I. Horowitz
	R.M.A. Richardson
	J.R. Scarrow
Walter F. Watkins Scholarships	D.J. Nerenberg
	Miss A.R. Gishman
	G.I. Goldlist
	M.B. Kamiel
	J.F. Fitzgibbons
	Miss M.C. McPhail

First Medical Year

William Edward Corlett Memorial Scholarship	
(renewal)	I.D. McLean
Dr. Thomas Arnold McCormick Scholarship .	H. Hui
Starkman Memorial Scholarship in Anatomy .	M.B. Ginsberg
Dr. C.S. Wainwright Memorial Scholarships .	R.H. Stubbs
	A. Korda
	J. Barclay
	R.F. Grossman
Walter F. Watkins Scholarships	L.E. Rotstein
	G. Pristupa
	J. Kellam
	V. Likwornik
	R. Hyland
	P.W. Strawbridge
John Zoberman Scholarship	M.B. Ginsberg

Second Premedical Year

Famous Players Canadian Corporation	
Scholarship	W.B. Soutar
Fulford Scholarship (No. 4 General Hospital) .	H.R. Cohen

Division of Rehabilitation Medicine

Beatrice Hally Memorial Prize	Miss Carol Larson
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DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor K.J.R. Wightman

The activities of the Division of Postgraduate Medical Education continue to expand. On the one hand there is an increasing responsibility for the welfare of internes,

fellows, and residents, who number over 1,000. Since they work in ten hospitals, under thirteen University departments, the problem of keeping track of them has been a large one. Continuing education of the practising physicians has also increased in tempo. Thirty-four courses were offered during the year, and were attended by 1,904 registrants – physicians, other health professionals, and clergy. The division also arranged for 34 teachers to visit eight community hospitals, chiefly in Northern Ontario. In addition, in co-operation with the Ontario Medical Association, five speakers were sent to local medical society meetings. These efforts are greatly appreciated, and it is very heartening to hear the comments of those who attend these courses and hospital sessions. In spite of their many pre-occupations, the members of the teaching staff have been extremely co-operative and enthusiastic. Their presentations have been well prepared and excellently delivered, and the division adds its thanks to those of the recipients.

We are also grateful to our devoted office staff, who undertake many extra duties in connection with these courses. The work of Mrs. Flinn and her associates is extremely efficient and makes everything go smoothly.

We anticipate with pleasure the assistance of Professor John Flowers as Educational Consultant. At the same time, we are to lose the services of Dr. John Godden, who will act as consultant to the faculty next year in matters of Medical Communication. We are very grateful to him for his work here in past years. Dr. Charles Alter will join the division to assist with courses, particularly with the Audio-Visual programme.

HONOURS

K.J.R. WIGHTMAN: honorary membership, College of Family Practice.

SCHOLARLY ADDRESSES

K.J.R. WIGHTMAN: "Diagnosis of Anemia," Baycrest Hospital, Toronto, September 17, 1969; "The Problems of Drug Addiction," Medical Legal Society, Hamilton, October 29, 1969; Academic Visitor, Thunder Bay, November 19–21, 1969; "Chemotherapy of Cancer," National Defence Medical Society, Ottawa, November 27, 1969; "Chemotherapy of Infection," Kitchener Medical Society, December 16, 1969; Postgraduate Course, Regina General Hospital, Sask., April 23–24, 1970; "The Use of Antibiotics," Ontario Medical Association Annual Meeting, Ottawa, May 6, 1970; Convocation Address, College of Family Practice, Toronto, May 13, 1970.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Professor A.T. Jousse

The initial impact of the new curriculum on this division, although imposing additional demands on the limited number of physiatrists available for intensive lecturing, was successfully met. The loyalty of the members empowered them to meet the challenge by participating in the teaching of musculoskeletal disorders as well as to provide audio-visual presentations on physical rehabilitation for the clinical clerks.

Fortunately, staff gains were recorded, quantitatively and qualitatively. The appointment of Dr. Jose Jimenez to Mount Sinai Hospital brings to our midst a highly competent physiatrist, teacher, and investigator. His support and aid will prove valuable in the period ahead.

Dr. Henry Silverstein also received an appointment to the teaching staff, and will work in collaboration with Dr. Jimenez at Mount Sinai Hospital.

The certification of Dr. Magda Vranic in Physical Medicine and Rehabilitation

has permitted her to join the staff of Sunnybrook Hospital, where she will contribute to the treatment and teaching programme. When time allows she will be able to carry out investigation.

Dr. Joseph Wong, who also obtained his certification in the autumn of 1969, has joined the staff in Physical Medicine and Rehabilitation at the Toronto General Hospital. Without his support and endeavour, both as a resident and later as a staff member, it would have been impossible for Dr. Geisler to carry on as the Acting Director of the department. Dr. Wong is presently preparing for the Fellowship Examinations in Physical Medicine and Rehabilitation.

Tentative provision has been made through the University and the Ontario Hospital Services Commission for the support of a physiatrist who will direct the treatment programme in Physical Medicine and Rehabilitation at St. Michael's Hospital.

At the Toronto Western Hospital, under the direction of Dr. Crawford, it is reported that the patient load of the Department of Rehabilitation Medicine increased 10 per cent, a point at which it is no longer physically possible to increase the patient load without sacrificing quality of care, teaching, and clinical research.

The Occupational Therapy Department at the Toronto Western Hospital has been reorganized. One of the new goals selected for this department is the assessment of disability in addition to treatment. The research there has been directed towards improvement in techniques of assessment and their standardization for post-clinical research purposes.

At the same time, the Physiotherapy programme has been cut back in an attempt to improve quality of care and to allow the staff to go into treatment in greater depth.

Although permission in principle was granted by the Ontario Hospital Services Commission in 1967 for the development of the new Lyndhurst Lodge Hospital, it was only in the current year that authority was granted for the Canadian Paraplegic Association and the Board of Directors of Lyndhurst Lodge to proceed with the development of plans which would lead to the building of a new institution for the care of paraplegics and other neurologically disabled persons. The new structure will accommodate over 100 patients and will be located south of Sunnybrook Hospital on the ravine property east of the Toronto Rehabilitation Centre. It is anticipated that this structure will be completed and functioning in two years.

The members of the teaching staff in Physical and Occupational Therapy continue to participate actively in the affairs of their respective professions. Miss Kathryn Falconer is the National Publicity Chairman of the Canadian Physiotherapy Association. Miss Faris and Miss E. Cook are members of the National Educational Committee of the Canadian Physiotherapy Association. Miss Ruth Bradshaw is National Chairman of the Board of Education of the Canadian Physiotherapy Association. Miss Adele Colthurst is National Vice-President of the Canadian Physiotherapy Association.

Miss Kathryn Falconer and Miss Adele Colthurst have written *Manual Muscle Testing*. This is now in press and will be available for use by students of Physical Therapy in September 1970.

The spring graduation contributed ninety-seven Physical and Occupational Therapists to the professional ranks, ten Speech Pathologists and Audiologists, and two teachers of Physical Therapy.

Intake in Physical and Occupational Therapy remains at one hundred and ten for the first year, and the applicants total over twice our present capacity. Two hundred and ninety-four Physical and Occupational Therapy students are registered in the three years.

RESEARCH

At the Toronto Western Hospital, Dr. Crawford and Dr. W. Franks are conducting a post-coronary evaluation programme. This includes an oxygen consumption evaluation and pulmonary function test repeated monthly. A synovial fluid analysis in rheumatoid arthritis is being done, as well as electromyographic investigation of Bell's Palsy. Sixty

cases have been reviewed to date conjoint and in collaboration with Dr. Robert Lee of the Department of Neurology. Dr. Crawford, in conjunction with Dr. Reginald Renaud, continues the study of the amputee programme at the Toronto Western Hospital, while Dr. Renaud is conducting independently an evaluation of the merits of horseback riding for the restoration of patients who have suffered strokes leading to hemiplegia.

Dr. Godfrey is carrying out research in the Department of Physical Medicine and Rehabilitation at Sunnybrook Hospital. His studies include: (1) investigation into the characteristics of socket pressures in above-knee amputees during walking, including correlation of these pressures with angular velocities and displacements at the knee and ankle are included in the investigation; (2) investigation of the effect of electrical stimulation on the recovery rate of neuropractic nerve lesions; (3) a developmental programme for a universal shoe for the painful arthritic foot; (4) a feasibility study of a physical fitness programme for females in a general hospital setting; (5) a feasibility study of the effectiveness of a multidisciplinary programme for children with learning disabilities in a general hospital setting (perceptually handicapped children).

At Lyndhurst Lodge Hospital, in conjunction with the Department of Neurology at Sunnybrook Hospital, a further study is being made of the incidence and course of cervical myelopathy secondary to traumatic paraplegia, together with an evaluation of the current results of surgical treatment.

HONOURS

C.M. GODFREY was appointed President of CARE Medico of Canada.

SCHOLARLY ADDRESSES

J. JIMENEZ, "Splints Prevention and Correction," Ontario Medical Association, Annual Meeting in Ottawa, May 8, 1970; "Semi-Dynamic Splints for the Hand," International Congress of the World Federation of Occupational Therapy, Zurich, Switzerland, June 1970; "Neuropathy in Rheumatoid Arthritis," Jornadas De La Sociedad, Espanola De Rehabilitation, Cat Sa Sal (Gerona) Spain, June 1970; "Physiotherapy as a Risk in Patients with Cardiovascular Diseases," to the Postgraduate Course for Physical Therapists, October 1969.

J.S. CRAWFORD, "Study of the Incidence of Thrombo-Embolicism in Surgically Treated Fractured Hips," presented at the Canadian Association of Physical Medicine and Rehabilitation in Halifax, Nova Scotia, August 1969.

C.M. GODFREY, "Prosthetic Devices, Splinting and Rehabilitation of the Hand," address to the Annual Meeting of the Hand-Surgery Group, Manus. Annual Meeting, May 27, 1970; "Cholera and Upper Canada," at the Annual Dinner of the School of Hygiene, Toronto, February 16, 1970; "Research Developments with Arthritic Shoes," address delivered to the Canadian Association of Orthotists and Prosthetists, Fredericton, New Brunswick, May 16, 1970; "Manipulation in Medical Practice," Hotel Dieu, Paris, August 29, 1970; "Rehabilitation in Canada," to the Orthopaedic Planning Council, Department of Health, Government of Indonesia, Djakarta, November 28, 1969.

PUBLICATIONS

JIMENEZ, J. and CARSON, G. "The Carpal Tunnel Syndrome" (*Applied Therapeutics*, vol. 12, 1970, pp. 27 and 31).

JIMENEZ, J., EASTON, J.K.M. and REDFORD, J.D. "Conduction Studies of the Anterior and Posterior Tibial Nerve" (*Archives of Physical Medicine and Rehabilitation*, vol. 51, 1970, pp. 164-9).

GODFREY, C.M. "Indonesia, a Pilot Project to Upgrade Indonesian Health Services" (*Applied Therapeutics*, vol. 11, 1969, pp. 634-7).

——— "A Planning Guide to Future Rehabilitation Services" (*Journal of the Canadian Physiotherapy Association*, vol. 22, 1970).

——— "Shoes for the Arthritic Foot" (*Rehabilitation in Canada*, winter, 1970, pp. 25).

——— "How to Recognize Speech Disabilities" (*Diagnostic Challenges*, S.K.F. 1970, pp. 16-20).

JOUSSE, A.T., GEISLER, W.O. and WYNNE-JONES, M. "Motivation in Rehabilitation"; in *Proceedings of the conference on the late effects of head injury*, March 1969. Springfield: Charles Thomas, 1969.

DIVISION OF INSTRUCTIONAL MEDIA SERVICES

Under the direction of Dr. J.K. Conway

The division's participation in the educational affairs of the Faculty focused on the preparation of tape/slide materials for Period III. Visual information in the form of slides, along with audio tapes to describe them, was made available for use in hospital seminars. The same information was provided for each of the teaching hospitals. The particular system used was designed and developed in the short space of six months.

Every new system has growing pains and this system was no exception. An evaluation carried out by Dr. Jerome Conway indicated where the technology was improperly applied and suggested methods for improving its use.

Dr. Swanson, the director, and Dr. Alberti gave seminars in each of the teaching hospitals on improving tape/slide preparation. Dr. Alberti produced an instructional tape/slide presentation for teachers entitled "How to make a Tape/Slide Production." This has since been in great demand both here and abroad.

Operation

The division became fully operational in the Photographic and Art Sections. However, the Television Section was plagued by delays in the arrival and function of equipment. Mr. Douglas Todgham, media co-ordinator for the University, provided advice regarding the operational alternatives available to the installation during this period.

HONOURS

DR. PETER ALBERTI was Chairman of the Committee on Educational Methods, American Council of Otolaryngology; and Chairman of the Educational Committee, Combined E.N.T. Programme for the U.S.A.

DR. J.N. SWANSON was Chairman-Elect of the Health Sciences Communications Centre (formerly the Council on Medical Television); Chairman of the Ontario Council of Health Audiovisual Systems Committee; and First President, Canadian Association for the Study of Instructional Media in Medical Education.

SCHOLARLY ADDRESSES

DR. PETER ALBERTI, "Audiovisuals in Otolaryngology," Association of University Otolaryngologists Annual Meeting, Portland, Oregon, March, 1970; "The Magic Lantern Show - 1970 Style," Council on Medical Television, Philadelphia, April, 1970; "Tape/slides and how to make them," Visiting Professor, University of Alberta Medical School, May, 1970; "Audiovisual systems in modern medical curricula," Visiting Professor, Albert Einstein School of Medicine, Yeshiva University, New York, May, 1970.

DR. JEROME K. CONWAY, "Forms of Information Representation and Cognitive Operations," Summer Conference on Research in Instructional Media, Indiana University, Bloomington, Indiana, June 26-28, 1969.

DIVISION OF STUDIES IN MEDICAL EDUCATION

Under the direction of Dr. A.I. Rothman

The change in title from Educational Research Unit to Division of Studies in Medical Education was accompanied by a change in objectives, functions, and the nature of interactions with the teaching faculty. Briefly this change may be characterized in terms of a shift towards service to the educational system, with research playing a supporting role.

ACTIVITIES

Psychological Testing Programme

Based on data collected over the past three years, we have chosen a series of tests measuring characteristics that relate to academic ability, personality, perception of learning environment, and career choice to serve as the stable core of our testing programme. In addition, we plan to develop an instrument relevant to our medical school environment which will sample the areas of students' attitudes and values. We plan, beginning with the class entering in September 1970, to administer our tests three times to each cohort, at the beginning of each of the curriculum's three periods. The continued use of the same tests will permit comparisons between different classes, and also enable us to describe changes within cohorts as they proceed through our educational programme.

Curriculum Evaluation

During the past year and with the active co-operation of the Medical Society and teaching faculty, considerable effort was spent in collecting and disseminating information pertaining to the new curriculum.

The division served as technical adviser and expediter in the activities relating to the structuring, administering, and processing of student questionnaires. Questionnaires were constructed and used in all but one of the systems and topics in Periods IA and IB, and for all systems in Period IIA.

A study describing the differences between beginning students' expectations concerning the medical school learning environment and their actual perceptions as measured at the end of Period IA was completed and the results circulated.

A study describing changes in Period III clinical clerks' attitudes towards concepts related to pediatrics is nearing completion.

A system whereby the time commitments of medical students are reported and analysed relative to the structure of the curriculum has been the subject of a pilot study and has shown some promise. It is our intention to expand the scope of this activity.

Multimedia Teaching

An experiment in multimedia teaching to large groups was carried out in co-operation with the Department of Art as Applied to Medicine and the staff of the television facility at Scarborough College. The purposes of this study were twofold: first, to evaluate the approach as an education system; second, to determine the value of parameters that pertain to the areas of organization and logistics. A preliminary report of this activity is presently being prepared.

Instructional Resources Laboratory

Over the past year, in co-operation with the Division of Medical Computing and Instructional Media Services, work continued on the development of a computer-controlled teaching system. Our efforts centred on the construction of a patient-management simulation that incorporated a random access slide projector as a source of visual material.

At present the installation is being modified so as to enable it to interact with more sophisticated media outputs. It is anticipated that developmental work in the areas of computer technology and educational applications will constitute the major part of our efforts in this activity for the next year.

Faculty Education

Twice during the past year the division brought to the faculty people from other centres with expertise relevant to problems arising out of our teaching programme. On September 16, 1969, Professors R.L. Ebel and Hilliard Jason from Michigan State University were the principal speakers at a workshop on student assessment. On February 12, 1970, Professors F. Wolpaw and E. Bowerfind from Case-Western Reserve University were the principal speakers at a session on seminar teaching.

ADVISORY SERVICE

The division's staff continued to assist individual faculty members and committees in problems relating to student assessment, the use of audio-visual resources, the design of experiments, and the statistical analysis of data. For example, the division (a) surveyed student reactions to the tape/slide presentations used in the central didactic portions of the Period III programme at the request of the Period III Committee; (b) surveyed staff and student opinions concerning marking systems at the request of the Student Affairs Committee; (c) co-operated with a member of the Department of Psychiatry in an experiment relating patients' personalities, parameters of disease (rheumatoid arthritis) activity, and treatment (administration of drugs); (d) co-operated with a member of the Department of Medicine in a survey of the professional reading habits of graduate students and staff physicians.

In addition, division members functioned as education consultants to the three period committees, the Student Affairs Committee, and several systems committees.

SCHOLARLY ADDRESSES

DR. ARTHUR I. ROTHMAN, "The Development of a Learning Environment Questionnaire for Use in Curriculum Evaluation," at the annual meeting of the Association of Canadian Medical Colleges, Toronto, October 20-22, 1969; "The Learning Environment of a Medical School: Expectations Versus Perceptions of a First-Year Class," at the annual meeting of the American Educational Research Association, Minneapolis, Minnesota, March 3, 1970.

DR. JOHN F. FLOWERS, "Longitudinal Prediction Studies," at Association of Canadian Medical Colleges, October 21, 1969; "Improving University Examinations by Computer Analysis," at a conference at York University entitled "The Promised Land of the Computer," May 12, 1970.

PUBLICATIONS

FLOWERS, J.F. "Learning and Retention in Medical Education"; in *Medicine in the University and Community of the Future: Proceedings of the Scientific Sessions marking the Centennial of the Faculty of Medicine, Dalhousie University*, September 11-13, 1968, ed. I.E. Purkis and U.F. Matthews, pp. 12-14. Halifax: Faculty of Medicine, Dalhousie University, 1969.

ROTHMAN, A.I. "Confidence Testing: An Extension of Multiple-Choice Testing" (*British Journal of Medical Education*, vol. 3, 1969, pp. 237-9).

——— "Teacher Characteristics and Student Learning" (*Journal of Research in Science Teaching*, vol. 6, 1969, pp. 340-8).

——— Review, *The Physics Teacher*, vol. 7, 1969, p. 108.

ROTHMAN, A.I. *et al.* "Teacher Achievement and Student Learning" (*Science Education*, vol. 35, 1969, pp. 253-7).

——— "Teacher Heterosexuality and Student Learning" (*Psychology in the Schools*, vol. 6, 1969, pp. 258-66).

DIVISION OF LABORATORY ANIMAL SCIENCE

Under the direction of Dr. L.R. Christensen

The single most important development affecting animal care this year is the passage of Bill 194 – the Research Animals Act – by the Provincial Legislature. This Act requires that unwanted, unclaimed animals impounded under municipal by-laws, be made available to medical research laboratories. Its effect will be to alleviate the long-standing shortage of dogs suitable for medical research. In addition, the law will establish basic standards for the production, housing and care of research animals, provision for the review of painful experiments, and a government inspectorate to ensure compliance. The Act requires the establishment by the University of a University Animal Committee to be the body responsible for the Act. The Act is an excellent one and should significantly improve animal care in Ontario. At this time, regulations have not been drafted and the Act will probably not be proclaimed until late summer or fall.

The Division of Laboratory Animal Science is responsible for animal care in the Medical Sciences Building, now fully operational, the Banting and Best Institutes, and #1 Spadina Crescent. It also operates a dog-conditioning facility at 121 St. Joseph St. In addition, the division is responsible for animal care at the Clarke Institute under a contractual relationship, and for the animal facilities of the Toronto Western Hospital, housed in the renovated facilities at Spadina Crescent.

There have been significant increases in the number of animals cared for by DLAS since the beginning of the fiscal year, as shown in the following table. This is a usual occurrence when new facilities are constructed. The census is still increasing, but experience would suggest that it will begin to plateau within the next 6–12 months. At present we are operating at about two-thirds maximum capacity.

AVERAGE DAILY CENSUS – MAY 1970

<i>Species</i>	<i>Census</i>	<i>Increase Over July 1969</i>
Dog	179	1.8×
Cat	64	5×
Monkey	29	8×
Rabbit	831	4×
G. pig	373	No change
Rat	2835	2×
Mouse	1585	No change

Medical Sciences Building: As indicated above, the animal facilities are now complete and in operation. They represent one of the largest, if not the largest biomedical research animal facilities under one roof in Canada. All caging, ancillary, and service equipment are new and of modern design, enabling the division to provide efficient, economical care, surpassing the standards recommended by the Canadian Council on Animal Care. The animal surgery facilities are worthy of special comment. We believe they rank among the best in North America and surpass many human hospital facilities in Ontario. In addition to the usual apparatus and equipment to be found in any well-appointed surgical unit, all rooms are supplied with gas anaesthesia machines. A heart-lung machine for cardiac surgery, sophisticated electronic monitoring equipment, and TV intensification and cine X-ray facilities are available. Special cages and equipment have been designed to facilitate post-surgical recovery care of the animals.

The mechanical washing equipment installed in the MSB has proven highly efficient. As a result, it is more practical to wash items from the outlying units of DLAS, such as water bottles, in the central facilities, avoiding laborious and unsatisfactory hand-washing.

Banting and Best Institutes: The surgical facilities on the fifth floor of the Banting Institute, formerly operated by the Banting Committee on Animal Care, could no longer be justified, following the move of many surgeons to the MSB. All major survival surgery, except for Dr. Bigelow's cardiovascular unit, is now conducted in the MSB facility. An X-ray unit in the Banting animal area was recently surveyed and found to be too hazardous for use. It will be discarded.

The sixth floor animal facilities were inadequate and inappropriate by modern standards. Accordingly, the vacated surgical facilities were renovated to meet standards recommended in *Care of Experimental Animals – A Guide for Canada*, and the animals from the sixth floor will now be housed there. Without extensive renovation, the major portion of the vacated space on the sixth floor is suitable for little other than storage and will be used as such for spare DLAS equipment.

The move of many investigators from the Best Institute to the MSB has resulted in a reduction in the Best animal census, permitting a consolidation of animal rooms and integration of the animal care staff of both buildings under one supervisor. While the facilities in the Best were never in as poor shape as those of the sixth floor in the Banting, a number of minor repairs and renovations have been made. A major improvement resulted from a thorough cleaning of the ventilation ducts, apparently untouched for years.

Although neither the Banting nor the Best animal facilities can ever be considered ideal, it is believed that the changes made will satisfy the regulations to be established under the Research Animals Bill until such times as proper quarters can be constructed.

#1 Spadina Crescent: The animals of the Department of Ophthalmology are housed in several interconnecting rooms on the first floor. New cages have been purchased for this facility which, together with the removal of bottle washing to the MSB, has improved animal care.

The Toronto Western Hospital, faced with inadequate quarters whose renovation would be very expensive, requested animal space on the third floor for rodents. This space was renovated in accordance with the recommendations of the division and the animal care integrated into the over-all DLAS operation. This represents the first such integration of the animal services of an affiliated hospital with the Faculty of Medicine.

121 St. Joseph St.: The conditioning area in the stable continues to satisfy our needs for conditioned dogs and will probably be adequate for another year or two. Shortly after initiation of the conditioning area, complaints were received about the barking of dogs. A sound-proofing programme was carried out which appears to have been effective. Conditioning of cats, also carried out in the stable at one time, is now done in the renovated animal room in the main building.

The cage washer installed in the main building, in anticipation of a large animal usage which has not materialized, is now not required for DLAS operations. It has been made available to the School of Hygiene and will be transferred soon. This will not only supply a piece of badly needed equipment to Hygiene, but will reduce University operating costs at 121 St. Joseph St., since it will no longer be necessary to maintain steam for washer operation.

DOG PROCUREMENT

Dog dealers are, in effect, outlawed by the new Research Animals Bill. This will impose some temporary hardship on the University in that dealers provided a pooling and staging facility for dogs collected from pounds, before their delivery to the laboratories. It will be necessary to establish such a collection and pooling facility for the animals which will now be obtained by direct negotiation between the University and the pounds. Eventually, the University will require a large rural area for the pooling, conditioning, and long-term holding of dogs and cats, as well as for holding many other animals for various schools of the University. Financial considerations render such a rural facility impossible at the present time, thus interim pooling arrangements must be made if the University is to take advantage of the animals made available under the

Bill. Preliminary discussions suggest that a satisfactory contractual arrangement can be made at less cost than building and staffing an interim facility of our own. If such a facility is established, it will be operated by DLAS who will also act as the purchasing and contracting authority for many of the affiliated hospitals. This will avoid multiple and conflicting arrangements with pounds, and should produce significant savings in transportation and administrative costs.

PERSONNEL

Dr. T.J. Taylor has been added to the staff with primary responsibility for dog and cat conditioning, veterinary care of animals, and animal surgery and post-operative care.

Mr. Eriks Ozols, formerly a supervisor of one of the primate colonies at CMRL, has joined our staff and will shortly be assigned assistant supervisory duties. His long experience in handling primates fills a void in our animal handling capabilities.

Mr. Ernie Reid, chief supervisor, is to be commended for smoothly integrating the various animal facilities added in the past year – Banting Institute, Spadina Crescent, Clarke Institute – and establishing a uniformly high level of animal husbandry in each.

A number of animal care staff members, transferred from other units to DLAS at its inception, will be retired this year. Mr. Hugh MacDonald served for 18 years as surgical technician in the Best Institute and Mr. Paul Allemand for 12 years in the animal section of the Department of Pharmacology. Their knowledge and experience will be missed, but the division is fortunate in that we have had at least a year to garner their experience.

Mr. Alex Moussalli, former order clerk, has joined the Medical Sciences Building Central Accounting Office as accounting assistant. He has been replaced by Mr. Robert Kendall.

As a result of the animal caretaker training courses conducted here, a number of the staff have been examined and certified as animal technicians. At present we have one Master Technician, four Senior, and four Junior Certificate holders.

EDUCATION PROGRAMME

The highly successful Canadian animal technicians training course, initiated here in 1968, was repeated in the fall of 1969. Again the response for a city of this size was amazing – 100 students registering. The success of these courses has stimulated similar programmes throughout Canada and courses have been given at Queen's, Ottawa, Dalhousie, the University of Alberta, and other universities. A number of other programmes are planned in the future.

A new course in elementary surgical techniques was initiated in March 1970, designed to give the research surgical technicians the basic scientific, technical, and practical facts they should have. To our knowledge this is the first course in North America. As in the case of the animal technicians courses, the response was surprising and gratifying – over 80 students registering.

The division has co-operated in providing facilities and technical help for the postgraduate surgical courses given by Drs. Sirek and Rappaport.

DISEASE CONTROL

Dr. Fletch, the division pathologist, has initiated surveys of animals from commercial sources. Information is beginning to accumulate which will enable judgments to be made on the relative quality of animals from our various suppliers.

The problem of endemic pneumococcal infection in rats persists, and we know of only one Canadian and two or three American suppliers whose animals seem to be free of this agent. The DLAS laboratory has obtained a set of pneumococcal typing serum from the U.S., as far as we know, the only such set in Canada, and the division is being called upon by other animal facilities in Canada to confirm and type suspected pneumo-

coccal infections encountered in their laboratories. This problem of pneumococcal infections seems to be a Canadian-wide one.

An unusual finding in our rabbits, and also in some referred from another institution, is a heavy *Nosema cuniculi* infestation. This is a small protozoan parasite which rarely produces serious overt disease, but may occasionally cause illness, and may be triggered to overt disease by experimental stress. A survey of our supplier indicates that the problem is common and apparently more prevalent than heretofore recognized. Studies are continuing to determine the extent and significance of the problem.

The TB screening programme for primates has uncovered one advanced case in a squirrel monkey. Preliminary tests indicate it is probably of human type.

The studies with the anthelmintic "Task" begun last year continue promising and indicate that use of this agent in the dog-conditioning programme is highly efficacious and will reduce the laboratory work required in our anthelmintic programme. The active ingredient in "Task" is Dichlorvos, the same as in the "Vapona" strips used for ectoparasite control. In collaboration with Dr. G.E. Johnson of the Department of Pharmacology, a study is being planned to determine both the effectiveness of the agent and any significant metabolic changes produced in animals by its use, which might influence their experimental response. It has already been determined that it will produce a transient, increased susceptibility to anaesthetics; however, the effect disappears before the animals are through their conditioning programme.

The laboratory has become proficient in the fluorescent anti-body techniques for detection of ectromelia and rabbit-pox infection. Under development is a fluorescent anti-body technique for detection of pasteurella infection, a common and troublesome disease problem in rabbits. Experience has shown that this fluorescent anti-body technique is a simple, rapid, and accurate method for many infectious agents, avoiding the necessity for the usual tedious and complicated culture procedures for bacterial and viral identification. Development of suitable procedures could significantly increase the screening and diagnostic capabilities of the laboratory, without a comparable increase in personnel.

The laboratory is apparently becoming recognized as a resource for disease detection and control, since requests for aid from affiliated hospitals, other schools of the University, other academic institutions, and some commercial laboratories continue to increase.

During the last eleven months the laboratory has performed 473 complete case necropsies (a "case" often represents a group rather than an individual animal), including histopathology, bacteriology, and such other procedures as indicated. In the mouse-rat supplier quality programme, approximately 200 animals have been surveyed, including histopathology, bacteriology, and parasitology.

SCHOLARLY ADDRESSES

DR. L.R. CHRISTENSEN, "Laboratory Science in the Medical School," Ontario Veterinary College, University of Guelph, March 1970.

PUBLICATIONS

FLETCH, A.L. "Traumatic Hemopericardium in a Squirrel Monkey" (*C.A.L.A.S. Newsletter*, September 1969).

ANAESTHESIA

Under the direction of Professor R.A. Gordon

During this session, attention has been focused particularly on development of the department's role in the Clinical Clerkship programme in the teaching hospitals,

the departmental contribution to the new undergraduate curriculum, and to the continuing evolution of methodology and facilities for teaching in the postgraduate course. The first of the departmental teaching laboratories has finally become operational in the Toronto General Hospital under the direction of Professor Samuel Galloon. Development of these essential programmes continues to be handicapped and in great part frustrated by the lack of space and equipment in the teaching hospitals.

There were 62 postgraduate students in the department during the year, 34 of whom were registered for the Diploma, the remainder being sessional students. The Diploma in Anaesthesia of the University of Toronto was awarded to Dr. Sophie Andriaschuk, Dr. E. Michel, and Dr. W. Stoyka.

A Refresher Course in Anaesthesia for General Practitioners was given from November 17 to 21, 1969, and was attended by 30 physicians who provide anaesthesia in smaller communities in Ontario. Dr. A.J. Dunn was moderator for this successful course.

Under the direction of Professor Alan Conn, the Department of Anaesthesia in the Hospital for Sick Children held a conference on Paediatric Intensive Care on November 8 and 9, 1969. This conference was attended by 275 physicians from all parts of the continent.

The Eleventh Doctor Harry Shields Lecture was given on November 7, 1969, by Dr. James Freeman of the Research Department of Anaesthetics of the Royal College of Surgeons of England. Dr. Freeman's subject was "The Cerebral Circulation in Anaesthesia." Visiting Professors during the session were Dr. David M. Little, Jr., of the Hartford Hospital, Hartford, Connecticut; Professor J.P. Payne, Research Professor of Anaesthetics, the Royal College of Surgeons of England; Dr. A.R. Hunter, University of Manchester. These visitors made significant contributions to the teaching programmes of the department.

Dr. Gerald Edelist has joined the department as Associate Professor and Anaesthetist-in-Chief, New Mount Sinai Hospital. Dr. Charles Bryan has joined the department as Associate Professor and as Director of Research and of the Hyperbaric Unit at the Toronto General Hospital. Dr. R. McIntyre was appointed Clinical Teacher at St. Michael's Hospital, Dr. P.R. Ramachandran and Dr. J.A. Hakes at the Wellesley Hospital, Dr. J.D. Armstrong, Dr. Mary Papantony, Dr. A. Russell, Dr. D. McCuaig, and Dr. D.J. Openshaw at the Toronto General Hospital, and Dr. D.D. Imrie and Dr. G. Eckert at the Toronto Western Hospital. Dr. T.R. Hanley, Dr. Douglas Blenkarn, Dr. Paul Bailey, and Dr. Evan Lloyd resigned from the department during the year, taking appointments elsewhere.

The death of Dr. Murray Mendelson on June 4, 1970 is a serious loss to the department. Dr. Mendelson joined the department and the staff at the Toronto General Hospital in 1963, and since that time had accepted responsibility for a demanding tutorial programme in the Diploma Course. He enjoyed teaching and was highly regarded by his students. He will be sorely missed.

Professor R.A. Gordon was guest speaker at the Congress of the Indian Society of Anaesthetists in New Delhi in December 1969. He was also guest lecturer at the University of Medical Sciences, Siriraj Hospital, Bangkok, Thailand, and at the Bangkok Christian Hospital, at the Vellore Christian Medical College, the University of Madras, and the All-India Institute of Medical Sciences, New Delhi. Professor Gordon also visited the College of Medicine of the University of Lagos, where this department has been sponsoring a development programme over the past eight years.

Professor Alan Noble was visiting Professor, Department of Anaesthesia, University of British Columbia in February 1970.

Professor Lucien Morris was Visiting Lecturer, Department of Anaesthesia of the Marquette School of Medicine, Milwaukee, Wisconsin, in March 1970.

Professor A.W. Conn was Visiting Professor in the Department of Anaesthesiology at the University of Rochester's School of Medicine and Dentistry and Strong Memorial Hospital, Rochester, New York, from March 23 to 27, 1970.

Dr. I.A.J. Sloan was Visiting Lecturer at the University of Cape Town in November and December 1969, where he was awarded the M.D. degree. Dr. Sloan

was also Visiting Lecturer at the University of Stellenbosch and the University of Witwatersrand, and at Otago University in New Zealand.

Professor Shirley Fleming attended the meeting of the Society of Anaesthetists of West Africa in Lagos, Nigeria, in May 1970. Professor Fleming is Founder and Past-President of this Society.

Professor D.C. Finlayson was Visiting Lecturer, Department of Anaesthesia, McGill University, in October 1969.

Dr. Iain M. MacKay was elected president of the Defence Medical Association of Canada, 1969–70, chairman of the Ontario Medical Association Section on Anaesthesia, and chairman of the Ontario Division of the Canadian Anaesthetists' Society. Dr. MacKay was also appointed Consultant in Military Medicine to the Canadian Forces Medical Council and Militia Adviser to the Surgeon General of the Canadian Armed Forces.

RESEARCH

Toronto General Hospital

Under the direction of Professor A.C. Bryan, Dr. A.K. Laws, and Dr. P.R. Ramachandran, with the assistance of Dr. Leslie Bowers and Dr. W. Mietani, have investigated the extended use of ventilation with positive end-expiratory pressure in the treatment of respiratory failure. This has proved to be invaluable in ventilating the severely damaged lung, particularly when using high pressures. They have also examined the effect of chest physiotherapy with a view to determining the actual effects of this form of therapy on lung mechanics. They have examined the distribution of ventilation and perfusion in cases of chest trauma, where the cause of failure of gas exchange is unclear, using a technique employing Xenon¹³³. In collaboration with the Department of Thoracic Surgery, they are examining the basic mechanical events in various types of pneumothorax in animals. The role of the upper airway in respiration is being investigated, as this appears to have a considerable influence on the behaviour of the lung. They have also continued to investigate the adaptation of man to acute hypoxia, using altitude as a convenient model. It is now apparent that intracellular migration of fluid plays a major part in this condition. There are also profound changes in retinal blood flow, which are assumed to reflect changes in cerebral blood flow. They have continued to investigate the effect of physical properties of respired gases on lung mechanics and gas exchange, both in the hyperbaric environment and in relation to pulmonary disease. In the hyperbaric environment they are preparing to study oxygen toxicity and the protective effect of various agents.

Dr. John Desmond in association with the Department of Obstetrics and Gynaecology has studied the effect of hyperventilation during Caesarean section on mother and child, and has studied carbon dioxide homeostasis and the ventilatory requirements during anaesthesia for laparoscopy.

Dr. Sallie Teasdale has collaborated with Dr. B. Goldman and Dr. A.S. Trimble of the Department of Surgery and Dr. Silver of the Department of Pathology in an investigation of the haemodynamic, biochemical, and histological changes associated with anoxic cardiac arrest as used in cardiac surgery; and with Dr. R. Heimbecker, Dr. Koven, Dr. Leask, and Miss G.E. Elliot in a study of changes in water balance after cardiac surgery using cardiopulmonary bypass. Dr. Teasdale has also studied the use of Bretylium Tosylate to prevent ventricular arrhythmias in cardiac surgery.

Dr. B.M. Marshall has continued his studies of problems related to cerebral vascular spasm, in association with Dr. W.M. Lougheed of the Division of Neurosurgery.

Dr. Samuel Galloon has studied the usefulness of Ketamine in anaesthesia for minor gynaecological operations.

Dr. Raymon Evans has continued his studies on the management of intractable pain, supported by the Irene Eleanor Smythe Fund. He has demonstrated the occurrence of metabolic alkalosis in patients suffering intractable pain associated with organic lesions, and a direct relationship between the severity of pain and the degree of

alkalosis. He has further demonstrated the possibility of altering the severity of pain in such patients by therapeutic manipulation of the acid base status.

Dr. Beverley Britt, with Professor Kalow of the Department of Pharmacology, has continued her studies of malignant hyperthermia occurring during the administration of anaesthetic agents.

Dr. John Brebner, working in Professor Kalow's laboratory, has continued his studies of the characterization of the soluble esterases of human tissues by starch gel zymograms, has made a preliminary survey on starch gels of the inhibition of esterases by analgesics, local anaesthetics, and halothane, and has estimated the molecular weight of the soluble esterases of lung, using Sephadex G-200 chromatography.

St. Michael's Hospital

Under the direction of Professor Lucien Morris, a series of studies have been done on dogs to determine the effect of anaesthetic agents and circumstances commonly associated with anaesthesia on the cardiac output. Dr. W.W. Stoyka has examined the effect of acid-base change during anaesthesia with fluroxene and with methoxyflurane. Dr. J.O. Sodipo and Dr. D.C. Lee with Dr. Morris have studied the effect of acid-base change during diethyl ether anaesthesia and the effects of propranolol on cardiovascular response to hypercarbia during halothane anaesthesia. Dr. Edith Simandl and Dr. D.C. Lee with Dr. Morris have studied the effect of acid-base change during cyclopropane anaesthesia, while Dr. Lee has studied the effect of atropine on cardiovascular responses during halothane anaesthesia, and the effects of acid-base change in the conscious dog. Dr. J.O. Sodipo has studied the ventilation response in the dog as modified by temperature. Dr. Edith Simandl is engaged in a study of effects of acid-base changes on rabbit skeletal muscle tension, and Dr. Valerie Jones has studied modification of gas chromatographic methods or blood levels of volatile anaesthetic agents. Professor Morris with Mr. Colin Kay has studied the interpretation of cardiac output data by multiple regression techniques.

Toronto Western Hospital

Dr. David Evans has continued his study on changes in cardiovascular haemodynamics during the veno-arterial bypass in the dog.

Hospital for Sick Children

Under the direction of Professor A.W. Conn, Dr. H.I.A. Nisbet and Dr. David Pelton have studied static thoracic compliance and its components in normal children and in children with cyanotic heart disease under general anaesthesia, and have investigated the effects of curare on the thoracic compliance. Dr. Pelton has studied the effects of humidity and aerosols on airway resistance in normal children and children with cystic fibrosis, and has determined plasma lidocaine concentrations following topical aerosol application to the trachea and bronchi.

Dr. J.A.J. Sloan has completed an investigation of the effects of methoxyflurane, halothane, and neurolept anaesthesia on lactic and pyruvic acid formation, and has investigated the development of lactic acidosis during different phases of anaesthesia for cardiac surgery.

Dr. David Steward has reviewed the incidence of congenital subglottic stenosis in patients treated at the Hospital for Sick Children and has commenced a study of changes in lung function in children during artificial ventilation in the Intensive Care Unit.

New Mount Sinai Hospital

Dr. Gerald Edelist has commenced a study of dissociative anaesthesia with ketamine to supplement regional anaesthesia and the use of ketamine as an induction agent for methoxyfluorene anaesthesia and has commenced a study of the effect of large volumes of balanced salt solution infused during inguinal herniorrhaphy under epidural anaesthesia on the rate of postoperative urinary catheterization.

Women's College Hospital

Dr. Hilda Roberts and Dr. K. Boyagian have studied electrocardiographic changes

associated with subcutaneous injection and topical application of epinephrine during anaesthesia, in patients undergoing cosmetic plastic surgery.

Sunnybrook Hospital

Dr. J.A.J. Emmett has conducted a study of the usefulness of diazepam as a sedative and relaxant in urological endoscopic procedures.

HONOURS

DR. SHIRLEY FLEMING was made a Life Member of the Society of Anaesthetists of West Africa in May 1970.

DR. BEVERLEY BRITT was awarded the Canadian Anaesthetists' Society Prize for the best paper reporting original work done in a Canadian Department of Anaesthesia and published in the Canadian Anaesthetists' Society Journal during 1969.

SCHOLARLY ADDRESSES

DR. LESLIE BOWERS, "The Effect of Positive Expiratory Pressure Plateau on the Cardiovascular System in Respiratory Failure," and "Physiotherapy and its Effects on Sputum Removal, Gas Exchange and Functional Residual Capacity," to the Annual Meeting, Canadian Anaesthetists' Society, Winnipeg, June 1970.

DR. JOHN BREBNER, "Esterases and Cholinesterases of Man," to the Departments of Anesthesiology and Pharmacology, University of North Carolina, Chapel Hill, N.C., February 25, 1970.

DR. A.C. BRYAN, "The Effects of Gas Density on Lung Mechanics in Asthma," to the Canadian Society for Clinical Investigation, January 1970; "Effect of Helium on Gas Exchange and Lung Mechanics in Asthma," American Physiological Society; "The Effect of Gas Properties on Flow Regimes and Gas Exchange," to the Department of Physiology, State University of New York; "The Limitations of Ventilation at Depth," and "Acid-Base Changes at Altitude," to the Department of Environmental Medicine, Ohio State University; "The Effect of Acute Altitude Exposure on Retinal Diameter and Flow," to the American College of Physicians; "Adaptation to Acute Hypoxia," to the Department of Medicine, McMaster University; "Acute Exposure to Altitude on Mt. Logan," to the Defence Medical Association of Canada.

DR. A.W. CONN, "Methods of Induction in the Pediatric Patient," "Pharmacology for the Pediatric Anesthesiologist," "Complications during Anesthesia," and "Special Problems in Pediatric Anesthesia," to the 8th Clinical Conference in Pediatric Anesthesiology, Children's Hospital, Los Angeles, January 23-25, 1970; "Naso-endotracheal Intubation in the Management of Airway Problems," to the University of Toronto's Conference on Pediatric Broncho-Oesophagology, February 21-23, 1970; "Advancement in Pediatric Anesthesia," to the 11th Annual New Jersey Postgraduate Anesthesia Seminar, Cherry Hill, New Jersey, March 7, 1970; "Use of Non-explosive Agents for Anaesthesia in Children," and "The Management of Respiratory Insufficiency in the Newborn," to the Refresher Course in Anaesthesia, St. Boniface General Hospital, St. Boniface, Manitoba, March 11-13, 1970; "Pediatric Anaesthesia," to the University of Rochester, School of Medicine and Dentistry and Strong Memorial Hospital, March 23-27, 1970; "Anaesthesia looks at Croup," to the Western Pennsylvania Society of Anaesthesiologists, Pittsburgh, March 26, 1970; "Pediatric Anesthesia - Toronto Style," "Anesthesia for Tracheo-Esophageal Fistula," "Treatment of Aspirin Poisoning," and "Workshop: Lip and Palate Surgery," to the Postgraduate Course in Anesthesiology, University of Kansas Medical Center, Kansas City, Kansas, April 13-15, 1970.

DR. J. DESMOND, "Anaesthesia for Laparoscopy," and "Hyperventilation during Caesarean Section," to the Canadian Association of Obstetricians and Gynaecologists, Jasper, Alberta, June 1970.

DR. S.A. FLEMING, "Anaesthesia in Nigeria," to the Calgary Anaesthetists' Society, Calgary, Alberta, October 1969.

DR. D.C. FINLAYSON, "Pulmonary Embolism - Pathophysiology and Management," to the Department of Anaesthesia, McGill University, October 1969.

DR. R.A. GORDON, "The Education of the Anaesthetist," to the All-India Conference on Anaesthesiology, New Delhi, December 1969; "The Effect of Position on Complications associated with Anaesthesia," and "Peripheral Nerve Injuries as a Complication of Anaesthesia," to the Department of Anaesthesia, Siriraj Hospital and Medical School, Bangkok, Thailand, to the Department of Anaesthesia, University of Madras, and to the Department of Anaesthesia, All-India Institute of Medical Sciences, New Delhi, December 1969; "Airway Closure and its Effect on Ventilation," to the medical staff, Bangkok Christian Hospital, Bangkok, Thailand, December 1969.

DR. GRISELDA GRIFFIN, "Effects on the Mother of Hyperventilation during Caesarian Section," to the Annual Meeting, Canadian Anaesthetists' Society, Winnipeg, June 1970.

DR. D.C. LEE, "Effects of D-Tubocurarine and Anaesthesia upon Cardiac Output in Histamine Depleted Dogs," to the meeting of the Federation of American Societies for Experimental Biology, April 16, 1970.

DR. L.E. MORRIS, "The Electroencephalogram in Hypothermia," to the North West Society for Clinical Research, January 2, 1970; "Homeostasis and Carbon Dioxide," to the Department of Anaesthesia, Marquette School of Medicine, Milwaukee, Wisconsin, March 23, 1970.

DR. A.B. NOBLE, "A Survey of the Complications of Spinal Anaesthesia in Canadian Teaching Hospitals, 1959-69," to the British Columbia Division, Canadian Anaesthetists' Society, February 1970.

DR. A.A. SCOTT, "Transporting the Patient in Respiratory Distress," to the Ontario Thoracic Society, October 24, 1969; "Respiratory Failure and Ventilation," to the Welland County Medical Society, January 28, 1970.

DR. J.M. SHAPLEY, "Fire and Explosion Hazard," to the Section of Anaesthesia, Ontario Medical Association, October 4, 1969.

DR. I.A.J. SLOAN, "Common and Uncommon Problems in Paediatric Anaesthesia," to the Michigan State Society of Anaesthesiologists, Detroit, November 1969; "Paediatric Anaesthesia," to the Department of Anaesthesia, University of Stellenbosch, November 1969, to the Association of Anaesthetists of South Africa, and to the University of Witwatersrand, Johannesburg, January 1970, and to Otago University, Dunedin, New Zealand, in February 1970; "Acidosis in Cardiac Anaesthesia," to the University of Stellenbosch, November 1969; "Acidosis in Paediatric Anaesthesia," to the Association of Anaesthetists of South Africa, Western Province Branch, December 1969.

DR. JOS. O. SODIPO, "Effects of Propranolol on Cardiovascular Responses to Hypercarbia," to the meeting of the Federation of American Societies for Experimental Biology, April 14, 1970.

DR. WM. W. STOYKA, "Cardiac Output Variations with Acid-Base Change during Tri-fluoro-ethyl-vinyl Ether (Fluoromar)," to the meeting of Federation of American Societies for Experimental Biology, April 15, 1970; "Cardiac Output Changes with Altered Acid-Base during Methoxyflurane Anaesthesia," to a meeting of the Canadian Anaesthetists' Society, June 23, 1970.

DR. SALLIE TEASDALE, "Changes in Water Balance after Cardiac Surgery using Cardiopulmonary By-Pass," to the Annual Meeting, Royal College of Physicians and Surgeons of Canada, Montreal, January 1970; "Shock," address in a symposium on shock, Brockville, Ontario, April 1970.

PUBLICATIONS

DALY, A.M. and CONN, A.W. "Pyloromyotomy: A Review" (*Canadian Anaesthetists' Society Journal*, vol. 16, July 1969, pp. 316-20).

DESMOND, J.W. "Complications of Transurethral Prostatic Surgery" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 25-36).

—— "Serum Osmolality and Plasma Electrolytes in Patients who develop Dilutional Hyponatraemia during Transurethral Resection" (*Canadian Journal of Surgery*, vol. 13, 1970, pp. 116-21).

DESMOND, J.W. and GORDON, R.A. "The Effect of Haemodialysis on Blood Volume and

- Plasma Cholinesterase Levels" (*Canadian Anaesthetists' Society Journal*, vol. 16, 1969, pp. 292-301).
- EDELIST, G. (with FRUMIN, M.J.) "Diffusion Anoxia: A Critical Reappraisal" (*Anesthesiology*, vol. 31, 1969, pp. 243-9).
- EDELIST, G. and OSORIO, A. "Postanesthetic Initiation of Spontaneous Ventilation after Passive Hyperventilation" (*Anesthesiology*, vol. 31, 1969, pp. 222-7).
- EMMETT, J.A.J. "Use of Intravenous Diasepam (Valium) as a Sedative and Relaxant in Urological Endoscopic Procedures" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 242-9).
- EVANS, D. and OZER, S. "A Simple Method of Arterial Cannulation" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 181-2).
- FLEMING, S.A. "Safety and Usefulness of Intravenous Regional Anaesthesia" (*Acta Anaesthesiologica Scandinavica*, supp. 36, 1969, p. 21).
- FINLAYSON, D.C., MCKENNA, J.P., CURRIE, D.J., MACDONALD, J.A., MAHONEY, L.J. and LANSKAIL, J.C. "The Use of Continuous Postoperative Peritoneal Lavage in the Management of Diffuse Peritonitis" (*Surgery, Gynaecology and Obstetrics*, vol. 130, 1970, pp. 254-8).
- FINLAYSON, D.C., YAO, J.K.Y., WILSON, J.K., CASELLA, L., GARVEY, M.B., DOUGLAS, F.G., HART, J.T., SELBY, D.A. and BAKER, C.B. "Human Heart Transplantation: Report of a Case" (*Canadian Medical Association Journal*, vol. 101, 1969, pp. 450-1).
- GALLOON, S. "The Volume of the Intra-Cranial Contents"; in *Cerebral Circulation*, ed. D.G. McDOWALL, pp. 663-86. Boston: Little, Brown, 1969.
- LAWS, A.K. and MCINTYRE, R.W. "Chest Physiotherapy: A Physiological Assessment during Intermittent Positive Pressure Ventilation in Respiratory Failure" (*Canadian Anaesthetists' Society Journal*, vol. 16, 1969, pp. 487-93).
- LEE, D.C. (with Johnson, D.L.) "Effects of D-Tubocurarine and Anaesthesia upon Cardiac Output in Histamine Depleted Dogs" (*Federation Proceedings*, vol. 29, 1970, abstract 741).
- MARSHALL, B.M. and LOUGHEED, W.M. "The Use of Electroencephalographic Monitoring during Carotid Endarterectomy as an Indicator for the Application of a Temporary By-Pass" (*Canadian Anaesthetists' Society Journal*, vol. 16, 1969, pp. 331-5).
- MCINTYRE, R.W., LAWS, A.K. and RAMACHANDRAN, P.R. "Positive Expiratory Pressure Plateau: Improved Gas Exchange during Mechanical Ventilation" (*Canadian Anaesthetists' Society Journal*, vol. 16, 1969, pp. 477-86).
- MORRIS, L.E. (with Enloe, G. and Sylvester, M.) "Hazards of Intra-arterial Injection of Hydroxyzine" (*Canadian Anaesthetists' Society Journal*, vol. 16, 1969, pp. 425-8).
- NISBET, H.J.A. "Effects of Curare on Thoracic Compliance" (*Medical Post*, 1969, p. 46) (abstract).
- NOBLE, A.B. Editorial, "Do Ethics Change?" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, p. 199).
- NOBLE, W.H. "Accuracy of Halothane Vaporizers in Clinical Use" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 135-44).
- PELTON, D.A., DALY, M., COOPER, P.D. and CONN, A.W. "Plasma Lidocaine Concentrations following Topical Aerosol Application to the Trachea and Bronchi" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 250-5).
- SCOTT, A.A. and GORDON, R.A. "The Role of the Inhalation Therapy Technician in a Respiratory Failure Unit" (*Hospital Administration*, vol. 11, 1969, pp. 38-40).
- SLOAN, I.A.J. "Anaesthesia during Operation for Congenital Heart Disease in Children, with Special Reference to Lactic Acidosis" (M.D. Thesis, University of Cape Town, 1969).
- SODIPO, J.O. "Effects of Propranolol on Cardiovascular Response to Hypercarbia" (*Federation Proceedings*, vol. 29, 1970, abstract 476).
- STOYKA, W.W. "The Reliability and Usefulness of the Suwa Nomogram in Patients in Respiratory Failure" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 119-28).
- STOYKA, W.W., MURPHY, P.V. and MORRIS, L.E. "Cardiac Output Variations with Acid-Base Change during Tri-fluoro-ethyl-vinyl Ether (Fluoromar)" (*Federation Proceedings*, vol. 29, 1970, abstract 525).
- WELSH, B.E. and CONN, A.W. "Jig for Measuring Endotracheal Tube Lengths" (*Canadian Anaesthetists' Society Journal*, vol. 17, 1970, pp. 183-6).
- "A Catheter Mount for Double-Lumen Endobronchial Tubes" (*ibid.*, pp. 187-8).

ANATOMY

Under the direction of Professor J.S. Thompson

Two major events mark the past year for the members of the Department of Anatomy. The first was the move from the old Anatomy Building into excellent new quarters in

the new Medical Sciences Building. Of particular interest is the move to new teaching laboratories for both Gross Anatomy and Histology. The laboratories are well equipped and make the tasks of both students and staff considerably more pleasant. The new offices and research laboratories for staff members are also well designed and equipped. These laboratories provide greatly improved conditions for graduate students engaged in our research programmes.

TEACHING

The second noteworthy event was the embarking upon the new programme in the Faculty of Medicine. The time for the Anatomical Sciences has been reduced and concentrated into the first eighteen weeks of the term. Both students and staff experienced numerous, fortunately minor, inconveniences in adapting to the new curriculum, but it is expected that, in the coming year, the programme will run more smoothly. Under the new programme, some 18 medical students voluntarily took electives in this department while another group of students took remedial electives to improve their knowledge of anatomical subjects.

The old Biology and Medicine programme in the Faculty of Arts and Science is being phased out and the teaching in the department altered accordingly. While courses for the students in the old programme are now terminated, a new general course, Anatomy 200, has been started.

Our programme of combined undergraduate-postgraduate training in Gross Anatomy has continued and expanded. Now postgraduate students in three specialties (Orthopaedics, Obstetrics and Gynaecology, and Otolaryngology) are seconded to the Department of Anatomy during the period when the undergraduate students are studying regions of the body of particular interest to those in these specialities. As a result, our undergraduate students get instruction from people closely associated with the clinical aspects of particular regions of the body and the postgraduate students have an excellent opportunity to learn the anatomy of the region with which they are most concerned.

There follows a listing of all courses given in the department to undergraduate, graduate and postgraduate students. The grand total is 1,841 students at all levels. It is of interest that of 1,650 undergraduate students registered in different courses in the department only 715 were medical students. These 715 were divided among three courses (Gross Anatomy, Histology, and Neuroanatomy, the latter, in 1969–70, being given to first- and second-year students). Thus, 935 undergraduate students not registered in the professional course in Medicine were taught by this department in 1969–70.

UNDERGRADUATE TEACHING

In 1969–70 the courses taken in the Department of Anatomy by undergraduate students in various faculties were as follows:

Gross Anatomy

37	Biology and Medicine students, third year
39	Anatomy 200
125	Dentistry students, first year
52	Dental Hygiene students, first year
175	Medical students, first year
6	joined by Art as Applied to Medicine
2	joined by Rehabilitation Medicine Teacher's Course
107	Rehabilitation Medicine students, first year
108	Rehabilitation Medicine students, second year
14	Speech Pathology and Audiology students
105	Physical and Health Education students, first year
68	joined by Nurses, first year
93	Physical and Health Education students, second year

Histology

36	Biology and Medicine students, third year
175	Medical students, first year
6	joined by Art as Applied to Medicine
107	Rehabilitation Medicine students, first year

Neuroanatomy

175	Medical students, first year
6	joined by Art as Applied to Medicine
2	joined by Rehabilitation Medicine Teacher's Course
190	Medical students, second year
3	joined by Art as Applied to Medicine
3	joined by Rehabilitation Medicine Teacher's Course
16	Speech Pathology and Audiology students
1,650	<i>Total in Undergraduate Courses</i>

GRADUATE TRAINING

Members of the Graduate Department of Anatomy supervised graduate students proceeding towards graduate degrees in the department and conducted courses taken by graduate students in this and other departments. One student obtained his M.Sc. in the 1969–70 academic year.

Graduate students proceeding to an advanced degree in the Department of Anatomy:

Towards M.Sc.	5
Towards Ph.D.	6

Formal Graduate Courses

3	Histology
14	Growth, Constitution and Evolution
4	Neuroanatomy
21	<i>Total in Graduate Courses</i>

POSTGRADUATE TRAINING

The Department of Anatomy conducts several formal courses for individuals who have already obtained a degree in the Health Sciences. They are now proceeding towards specialist diplomas or towards Certification or Fellowship in the Royal College of Physicians and Surgeons of Canada.

Formal Postgraduate Courses

20	Graduate Dental students
23	Residents in Diagnostic Radiology
4	Residents in Therapeutic Radiology
16	Residents in Anaesthesia
9	Residents in Ophthalmology
12	Residents in Otolaryngology
20	Residents in Neurology
37	Advanced Course in Surgery
18	Advanced Course in Obstetrics and Gynaecology
159	<i>Total in Postgraduate Courses</i>

In addition to the above formal courses, the staff of the department supervised training in Anatomy to students taking specialties at the hospitals associated with the University of Toronto. These postgraduate students dissected the appropriate portions of the human body and demonstrated to medical students.

Speciality

4	Orthopaedics
3	Obstetrics and Gynaecology
6	Otolaryngology

STAFF

There was only one change in the full-time staff of the department during 1969–70. Dr. E.S. McDaniel resigned to take up new duties in the United States.

We again acknowledge the assistance of various individuals who devote part of their time to departmental duties. Some of these have clinical practices in Medicine or Dentistry, while some are still in training in various hospitals and clinics. Others leave their positions in various laboratories to offer assistance. To all of them we extend our thanks.

Our staff members continue to hold cross-appointments in various departments and institutes, including Anthropology, Biomedical Electronics, Dentistry, and the Institute of Medical Science.

RESEARCH

Dr. A.A. Axelrad and his associates have continued their investigations on the processes initiated *in vivo* by the Friend Erythroleukemia Virus and on the development of a system for erythroid differentiation *in vitro*. With Mrs. W. Brown, it had been demonstrated previously that the fall in circulating blood platelets which occurs after infection with FV is preceded by a fall in the number of megakaryocytes in bone marrow. With the help of a method devised for separating megakaryocytes in quantity and with microspectrophotometry, it has now been shown that it is the mature megakaryocytes with the highest DNA content, and not their precursors, that are eliminated after leukemia virus infection.

With Mr. J. Stephenson, leukemic cells induced by FV have been shown to possess the unique property of hemoglobin synthesis while circulating in the peripheral blood of adult mice. An assay method for responsiveness of fetal hemopoietic cells to erythropoietin *in vitro* has been devised, and it has been shown that the erythropoietin-responsive cells are physically separable from hemopoietic colony-forming stem cells, and in collaboration with Dr. D.L. McLeod and Mrs. M. Shreeve, colonies of heme-synthesizing cells have been produced *in vitro* with fetal hemopoietic cells exposed to erythropoietin.

Dr. E.G. Bertram's research is in two areas: (1) A continued study of the capillary-neuronal relationship in the cerebral cortex of cat and man is under investigation in this laboratory. The modified Golgi technique of Bertram and Ihrig is employed. This simultaneously and selectively stains the walls of blood vessels and the cell bodies and processes of neurons. The direct areas of contact and the amount of surface area involved is measured between cell bodies or processes of neurons and the walls of capillaries. The surface area that is occupied by the processes of neuroglial cells between the capillaries and cell bodies of neurons is also being measured and determined. Previously, this cortical study was limited to special sensory areas but now is extended into motor, general sensory, and basal ganglia regions. EM studies of capillary-neuronal relationships in these areas will also be undertaken. (2) In addition, the recurrent collaterals of cortical neurons are being studied. This is a morphological investigation of the fine branches of axons that course back into layers three to five of the cerebral cortex. The modified silver staining method of Bertram and Ihrig is employed to trace these fine structures for great lengths within the cortex and medullary centre of cat and man. Preliminary studies thus far have indicated that with increasing age, the number of recurrent collaterals is reduced or lost and the number of neuronal cortical connections is reduced. This morphological finding may have some significance in cases of senility.

Dr. D.H. Cormack is investigating whether the surface charge on tumour cells plays any role in tumour colony formation. Virus free lines of polyoma-virus-induced transplantable renal sarcoma were used for the study. A lung colony method in syngeneic hosts was developed to assay colony formation *in vivo* and a plating technique, in semi-solid medium, was developed to assay colony formation *in vitro*. Comparative

studies *in vivo* and *in vitro* are underway to determine the effects on tumour colony formation of polycations, basic dyes, neutral polymers, and polyanions. Preliminary results have indicated that polycations depressed colony formation. The reversibility of this effect is now under investigation.

Dr. J.W.A. Duckworth has conducted research for the revision of the chapter, "The Embryology of Congenital Heart Disease," in *Heart Disease in Infancy and Childhood* by Keith, Rowe, and Vlad, including the preparation of two new sections, "The development of the conduction system" and "Congenital anomalies associated with abnormal development of the bulboventricular loop." He has also supervised the research of Mr. Bruce Fraser on the development and fate of the ultimobranchial bodies in humans.

Dr. V.I. Kalnins is continuing studies of centriole assembly and development in organ cultures of chick trachea during ciliogenesis and has shown that the accumulation of dense material around the two original mature centrioles of the diplosome is one of the first steps in the assembly of the new set of immature centrioles. The structure and staining properties of this material suggest that it is a precursor of the cylinders found later in the central part of clusters of immature centrioles. This material is more resistant to pepsin digestion than the mature and immature centrioles. The technique for doing EM autoradiography has been established by Miss C. Turnbull and attempts are being made to determine whether or not DNA, RNA, and protein are being synthesized in the region around the two mature centrioles during centriole assembly. Electron microscopic examination by J.H. Weinroth of Friend Virus (FV)-induced spleen foci in mouse strains from which neither infectious FV nor FV-induced tumour cells have been recovered showed that numerous budding type A and type C particles are present in the cells of these foci. Attempts are being made by L. Subrahmanyam and by J.H. Weinroth to produce humoral antibody to single weak histocompatibility antigens. This antibody will be used to localize these antigens on the cell surfaces and to determine their relationship to budding FV.

Dr. B. Liebgott continues research in two areas: (1) The application of factor analysis techniques to measurements taken from serial cephalometric radiographs of boys 4–15 years of age. The problem is divided into 4 phases: (a) to determine whether a battery of cranio-facial measurements can be described in terms of considerably fewer underlying factors; (b) to determine whether the same factors are extracted from year to year; (c) to trace the growth of the isolated factors from year to year; (d) to score the individuals of the study in terms of the newly found factors in an effort to determine whether certain growth disharmonies of the cranio-facial complex can be classified in terms of the factor scores. (2) An investigation of the physical growth and development of children afflicted with congenital lateral facial dysphasias.

Dr. D.L. McLeod has developed a plasma gel system for the culture of colonies of hemopoietic cells from suspensions of bone marrow or spleen cells. Until recently the colonies produced were made up of only granulocytes and macrophages. With modifications in this system, it is now possible to produce erythroid colonies as well. This *in vitro* system will now be used to study factors which influence differentiation of hemopoietic cells and also to study the leukemic transformation of hemopoietic cells by Friend erythroleukemia virus. A second part of the research programme is a study of the distribution of normal colony-forming units in spleen, bone marrow, and peripheral blood of Friend virus-induced leukemic animals. A preliminary study has shown that the ratio of normal colony-forming units to total number of hemopoietic cells in the tissues of leukemic animals is as great or greater than it is in the tissues of healthy animals. Experiments to verify this finding are in progress.

Dr. C.G. Smith and colleagues studied the striate branch of the middle cerebral artery described by Abbie as "the deep artery of the optic radiation." Dr. Peter Richardson injected the middle cerebral arteries of eight brains. These were sliced serially, stained, and examined by Dr. Freda Richardson and Dr. Smith, using a newly acquired dissecting microscope. The stain was required to show the veins. The results indicate that the only supply to the optic radiation from the middle cerebral artery is

provided by successive branches that penetrate the cortex. These penetrating branches are deflected to follow the fibres of the optic radiation and it is possible they were mistaken for branches of a single striate artery.

Dr. J.S. Thompson, working with Dr. A. Roberts, has shown that two inbred strains of mice apparently exhibit different sensitivities to dietary induced atheromata. Preliminary results show that the c57BR/edJ strain is very sensitive, showing significant intimal lesions with foam cells within three weeks following the commencement of a special atherogenic diet. In contrast, CBA/J mice show virtually no incorporation of fat in intimal cells at three weeks and only very little at five weeks. Indeed the CBA/J mice must be on the diet for about 10 weeks to exhibit lesions approaching the severity of the lesions in c57BR/edJ animals after only three weeks on the diet. Breeding experiments have now been commenced to determine, if possible, the nature of this apparent genetic difference between the two strains.

HONOURS

DR. J.W.A. DUCKWORTH is President of the Central Ontario Branch of the Defence Medical Association of Canada.

DR. A.A. AXELRAD is a member of the Research Advisory Group of the National Cancer Institute of Canada.

DR. E.G. BERTRAM is a Canadian delegate to the Ninth International Congress of Anatomists, Leningrad, August 1970.

DR. J.K. HOUSTON received his Fellowship from the Royal College of Physicians and Surgeons of Canada.

SCHOLARLY ADDRESSES

DR. A.A. AXELRAD chaired a symposium of the Canadian Society for Cell Biology entitled "Viral Genome Expression in Animal Cells," June 1970.

DR. V.I. KALNINS was an invited discussant on "Centriole Replication" at the conference on the Control of Form in Cells, sponsored by the University of Colorado, Estes Park, Colorado, September 1969.

REVIEWS

DUCKWORTH, J.W.A. "Introduction to Human Embryology," by James Blake Thomas, *Canadian Medical Association Journal* (vol. 101, no. 8, Oct 1969, p. 493); "Introduction to Human Embryology," by James Blake Thomas (*The Medical Post*, June 17, 1969, p. 8).

PUBLICATIONS

CORMACK, D.H. "Effect of Enzymatic Removal of Cell Surface Sialic Acid on the Adherence of Walker 256 Tumour Cells to Mesothelial Membrane" (*Cancer Research*, vol. 30, 1970, pp. 1459-66).

DUCKWORTH, J.W.A. "The Anatomy and Movements of the Sacroiliac Joints" (*Manuelle Medizin und Ihre Wissenschaftlichen Grundlagen*, Kongresband mit den vortragen von 2 Kongres der Internationalen Gesellschaft für Manuelle Medizin in Salzburg, 1968, pp. 56-60).

KALNINS, V.I. (with Porter, K.R.) "Centriole Replication during Ciliogenesis in the Chick Tracheal Epithelium" (*Zeitschrift für Zellforschung*, vol. 100, 1969, pp. 1-30).

SMITH, C.G. "A Guide to the Dissection of the Brain"; in *Basic Neuroanatomy*, by Carlton G. Smith, pp. 247-68. Toronto: University of Toronto Press, 1969.

THOMPSON, J.S. "Atheromata in an Inbred Strain of Mice" (*Journal of Atherosclerosis Research*, vol. 10, 1969, pp. 113-22).

——— "An Effect of Genotype on the Incidence of Atheromata" (*Anatomical Record*, vol. 166, 1970, p. 389) (abstract).

THOMPSON, M.W. and THOMPSON, J.S. "Genetic Considerations"; in *Pediatric Surgery*, (2nd ed.) ed. W.T. Mustard, M.M. Ravitch, W.H. Snyder, K.J. Welch and C.D. Benson, pp. 7-16. Chicago Year Book Medical Publishers, 1969.

ART AS APPLIED TO MEDICINE

Under the direction of Professor Nancy Joy

With a total of 11 students in the B.Sc. AAM three-year programme, the department nevertheless holds its own on the continent and indeed in the world, both in size, modest as it is, and in the quality of the people it turns out. A current graduate was spoken for by Laval three years ago; a first-year student has an arrangement with the University of Montreal for summer work while in course, and an appointment on graduation; and the University of Manitoba, after waiting two years for one of last year's graduates, has asked this year for a summer student as well.

Since the inauguration of the degree in 1968 and in response to a vigorous public relations programme, including an annual open house and the circulation of a vocational guidance pamphlet, which was revised this year, to the secondary schools and art schools all over Canada, the calibre of applicant entering the course has steadily improved.

The School, established as a diploma course in 1945, has a sound record in the traditional fields, those involving pen, pencil carbon dust, spray gun, plaster, wax, and other graphic art forms, most of which have been familiar to artists since mediaeval and even earlier times. Today its position in a burgeoning and very dynamic metropolis blessed with professional developments in all the audiovisual arts makes it well able to project this conventional knowledge and expertise to the new field of film, slide tape and loop both audio and video, to say nothing of the computer. A step has already been taken in the latter potentially tremendous and important area with the Institute of Computer Science, a group pre-eminent in North America for their advanced thinking, by the initiation of a joint programme in which several physiological phenomena are to be demonstrated by harnessing the computer's ability to produce an animated sequence containing particles moving in a random distribution, within a structured flow pattern. Contact has also been made with the Department of Engineering and Material Sciences to have AAM students investigate, next session, the graphic significance and uniqueness of the image provided by the electron scanning microscope.

Art as Applied to Medicine, despite a straitened financial situation, is also trying to exploit to the maximum all the outside sources of knowledge and inspiration it can by inviting, both for long and for short term periods, visiting specialists who can contribute to areas underdeveloped here; or, if more practical, by organized visits elsewhere for the students themselves. Among those to visit us, to the delight of the students, were Allan Fleming of the University of Toronto Press, known internationally for his logo-type designs including that of the Canadian National Railway, and Keith Scott, a former teacher of typography at Central Technical School, who conducted a series of seminars. William Stenstrom, Professor of Medical Illustration in the Department of Art and Visual Education of the University of Texas, while in Toronto to give the Lloyd Morgan Lecture in Ophthalmology at the Sick Children's Hospital, demonstrated for the students' edification his rare anatomical knowledge and superb water colour technique in a grand seminar on eye fundus painting which was recorded on video tape by the AAM students for later analysis. Another visitor, Judith Smith, one of the first to receive the B.Sc. AAM degree and head of the Medical Art Department of the Royal Victoria Hospital in Montreal, joined us for several days in April to work with the students. Señor Jorge Pérez Vela, to whose time we have enjoyed a long claim during the past several years, has contributed a truly professional approach in several important areas. A skilled water colourist, he has inspired the students to master that very difficult but invaluable and useful medium. His knowledge of exhibit design and production and his ability to teach have been demonstrated in the success of the students' recent open-house exhibits. As it will not be possible for Señor Pérez Vela to be with us next session, it is hoped to invite for this coming year a medical artist who has specialized in various fields, including neuroanatomy and medical sculpture.

In September, third-year students accompanied AAM staff to the meetings of the Association of Medical Illustrators in Washington. Here they met for the first time many of their future professional colleagues, and attended seminars which included a particularly well-organized one on analysis of films by the producers. In November, first- and second-year students visited the University at Ann Arbor as part of a curriculum exchange programme with the School of Medical Illustration there. The faculty at Ann Arbor had prepared two days of seminars and work shops and had invited the Medical Art Director of Saunders Publishing Co., Mr. Grant Lashbrook, to talk to the combined group of students about publisher, author, artist relationships and graphic reproduction.

The change to a systems approach in teaching by the Medical faculty has necessitated corresponding changes in the structure of the AAM course. It has meant that the students must concentrate more exclusively at any given time on either academic subjects or on applied art projects. This is different for the students and every effort is being made to compensate. It does, however, permit a larger project than before to be tackled by a group, and this was done in the display produced for open house this year. In certain instances this is a good teaching method but it would not be to the best interest of the students to make it a frequent practice. In this instance, by constructing an exhibit to display the sequence of steps followed to produce a profusely illustrated multimedia programme, the students studied the theory of production design as related to several media and they learned many practical lessons by carrying through their ideas and constructing a professionally finished exhibit. An amplification of the initial stages of this project, whereby these principles of design might be applied to the production of film, video tape, or sound-dubbed slide collection, would form a sound academic basis for much needed postgraduate courses for B.Sc. AAM graduates, for medical student electives, and for the core material of a master's programme in Programming and Content Design for Audio-Visual Media. It should be noted that in community and technical schools there are already courses giving technical training in production, which might be a prerequisite requirement or be integrated in other ways into such a graduate programme. The AAM Department is already offering an elective in Book Production to Period III medical students. This will be offered to a wider group of medical students next year and could be modified to relate to formats other than that of the book. However, without more space and special equipment, any plans to develop new programmes are seriously limited.

RESEARCH AND DEVELOPMENT

In September 1969, the first Joint Campus Audio-Visual Project was undertaken by the Faculty of Medicine and Scarborough College. It was the direct result of a request by the faculty's Department of Physiology and the Educational Research Unit to the AAM Department for illustrations for ten two-hour lectures. The excessive length of the lecture period was matched by the jumbo size of the lecture room. There, above the huge but strangely dwarfed blackboard on which chalk messages appear to fall on the borderline of legibility, were three massive projection screens offering an opportunity which, allowing for the restraints of the subject itself, was only limited by our own imagination and lack of experience and by a host of minor technical problems – many stemming from the unavoidable difficulties of using major audio-visual installations for the first time.

Mr. Bob Rodgers, Chairman of Scarborough's Education Communication Unit, made available the experience of his tv production staff and the use of production facilities not then available in the Medical Sciences Building. The production team included Jorge Pérez Vela who acted as design co-ordinator, Bridget Hough, art supervisor, and Abby MacInnes, production assistant from the AAM Department, and Dr. Jan Blumenstein, lecturer, from the Department of Physiology and the Medical Education Research Unit, and Malcolm Copley, a producer, supplied by Scarborough College. The programme, whatever its intrinsic value, was important. If it did nothing

else, it revealed both the problems we face, and an honest effort to come to grips with them. It showed for all to see good and bad presentation, good and bad art, good and bad editing; and it has given us a rule by which to measure ourselves.

Because ultimately the contribution any department can make is dependent on the funds that accrue to it departmentally or by its earnings, an effort is being made to explore methods of earning funds which will be used to buy knowledge and experience elsewhere, either in the form of visiting experts or in packaged av programmes. To this end, arrangements have been made with the Library School's Media Centre for the distribution of the film by H.O. Barber, "Dizziness," which was produced by the AAM Department staff last year, and as 80 per cent of royalties, assigned by the authors to the Governors of the University, are to be returned to the ENT and AAM departments, sales and rentals are already beginning to generate a small revenue. Another potential source of revenue lies in the department's share of royalties which may be earned from sale of a study carrel jointly designed by Nancy Joy of the AAM Department and Donald Forgie of the School of Library Science, which has been patented by the office of Research Administration for the Governors of the University and is being licensed to a manufacturer for mass production.

The Medical Art Teaching Program and the Service Department separated administratively in July 1969. Physically the two still share the same quarters. This juxtaposition of students and staff in the present AAM Department's very crowded quarters has held incalculable advantages for the students. They have watched step by step the research and development programmes, participating in them from time to time when it was to their advantage to do so. They have become familiar with the day-to-day routine of a service department, and they have been able to obtain casual supervision when they felt they needed it. As the Service Department expands, some separation will be inevitable, but a complete physical separation would enfeeble the teaching programme disastrously and would create problems for persons with joint appointments. A separate report on Art Services will be made by Mr. Heinz Loth, B.Sc., AAM who became supervisor of Medical Art Services on July 1, 1969.

PUBLICATIONS

Joy, N. *Medical Illustration: Cumulative Bibliography*. Association of Medical Illustrators, privately circulated 1970. Pp. 51.

——— *Medical Illustrator: Occupational Information Monograph*. Catalogue #01-296, Toronto: Guidance Centre, College of Education, University of Toronto, March 1970. Pp. 4.

Joy, N. and FORGIE, D. "Honeycomb Constudium Carrel." *Provisional British Patent* No. 6,587/70, Feb. 1970.

BACTERIOLOGY

Under the Acting Chairmanship of Professor Arthur E. Franklin

Dr. J.C. Sinclair, who has been an Associate in the Department of Bacteriology since 1956, has resigned from his post effective June 1970. Dr. Sinclair and his associates will continue their studies on Australia antigen at the Provincial Health Laboratories.

The department was saddened by the death of Mrs. Mary Barrens in November 1969. She had been a valued and popular member of our group for twenty years.

New part-time appointments to the department include Dr. A.J. Smith (New Mount Sinai Hospital), Dr. H. Sepp (Toronto Western Hospital), Dr. R. Bannatyne (Department of Pathology), and Dr. I. Campbell (Toronto General Hospital).

Dr. S. McDonald, Sunnybrook Hospital, recently attended a training course in laboratory methods in medical parasitology at the National Communicable Diseases Center in Atlanta, Georgia.

Dr. N.A. Hinton, who is currently Professor and Chairman of the Department of Microbiology, Queen's University, Kingston, Ontario, has accepted the Chairmanship of our department, effective August 1, 1970.

RESEARCH

Dr. R.C. French, in collaboration with Dr. L. Siminovitch, Department of Medical Cell Biology, is carrying out a study of several temperature-sensitive mutants of mouse L-cells and Chinese hamster cells, which involves karyotyping these cells and comparing the mutants with the parent cells. It is proposed to attempt the hybridization of these mutants with the parent cells, with each other, and with other mammalian cell lines. If the hybridization experiments are successful, the resulting hybrids may be used to study control mechanisms and may be useful for genetic analysis of somatic cells.

Dr. A.E. Franklin, in collaboration with Dr. D.A. Gordon and Miss G. Pawlin, Wellesley Hospital, is determining certain viral, bedsonial, and mycoplasmal antibodies in the sera of patients with various collagen disorders, with particular reference to rheumatoid arthritis and systemic lupus erythematosus. Serological studies are carried out at various stages of the illness to investigate the possible role of non-bacterial agents in the etiology and pathogenesis of this group of disorders. The relationship of these antibodies to such factors as the rheumatoid factor, LE cells, and various immunoglobulin fractions is a part of this study.

Miss Joan Hennessy is using a variety of cell lines in tissue culture studies to attempt an isolation of the etiologic agent of cat scratch disease. Cat scratch antigen is also supplied on an experimental basis for skin tests to various hospitals and clinics in Canada and the United States.

Miss Hennessy, in collaboration with Dr. P. Tuffnell, Dr. K. Jeejeebhoy, and Mrs. H. Smith, is studying the incidence and role of anaerobic organisms, particularly those of the *Bacterioides* group, in jejunal and duodenal aspirates from patients with conditions such as the blind loop syndrome, steatorrhea, etc.

Dr. P. Tuffnell, Toronto General Hospital, in collaboration with Mrs. H. Smith, is engaged in a study dealing with the epidemiology and diagnosis of *Pseudomonas aeruginosa* infections. Dr. Tuffnell and Dr. I. Campbell are also evaluating the clinical use of the antibiotic "Septrin."

Dr. I. Campbell, Toronto General Hospital, is carrying out a joint study with the Cardiovascular department, by culturing specimens from various intravenous catheters to determine if a correlation exists between duration of use of the catheters and clinical infection.

Dr. A. Gray and Dr. K. Givan, Women's College Hospital, in collaboration with the Department of Medicine, are investigating antibodies to *E. coli* in urinary tract infections. They also have commenced studies of the Australia antigen, utilizing the large number of sera collected during the 1968 outbreak of "hippie hepatitis," as well as the specimens currently available in the hepatitis clinic.

Dr. I.B.R. Duncan and Dr. S. McDonald at Sunnybrook Hospital are continuing a long-term series of investigations on Gram-negative bacilli with particular reference to the incidence of infections caused by these organisms in hospital, their epidemiology, and their chemotherapy. Dr. Duncan, with Dr. Alberti and Dr. Barber of the Department of Otolaryngology, is carrying out an investigation of the toxicity of the antibiotic Gentamicin for the eighth cranial nerve. This involves carrying out very sensitive tests for auditory and vestibular function and monitoring Gentamicin levels in the patient's serum throughout the course of treatment with the drug. Dr. Duncan is carrying out an investigation of the antibiotic sensitivity of a large series of clinical isolates of *Pseudomonas aeruginosa*. The antibiotics Gentamicin, Carbenicillin, and the Polymyxins are being investigated in detail, and resistance patterns of strains are being correlated with their pyocine types. Dr. Duncan has also instituted a clinical trial of the new member of the cephalosporin group of antibiotics, Cephalexin. Dr. McDonald,

in collaboration with Miss E.V. Booth, is investigating the pathogenicity and classification of a previously unclassified group within the Enterobacteriaceae family. Long-term investigations involving various members of the department are being continued on the epidemiology of hospital infections due to *Pseudomonas aeruginosa*.

Dr. P.C. Fleming, the Hospital for Sick Children, is investigating the interactions of microorganisms and antibiotics with special reference to cephalosporin and cephalosporinase. He is also carrying out a study relating to the identification of microorganisms by pyrolysis gas chromatography. Clinical studies include a continued investigation of the treatment of meningitis, treatment of staphylococcal osteomyelitis with cephaloridine and penicillin, and studies of mycoplasmal infections.

Dr. A.J. Wort of the Hospital for Sick Children is investigating phagocytosis and intracellular destruction of bacteria with particular reference to children with fatal granulomatous disease.

Dr. P. Middleton of the Hospital for Sick Children is investigating the application of fluorescence microscopy to problems in diagnostic virology.

Dr. W.-D. Leers, Wellesley Hospital, is carrying out haemagglutination studies of reoviruses and picornaviruses, to see if the application of such studies would facilitate diagnosis of these agents from clinical specimens.

HONOURS

DR. I.B.R. DUNCAN was appointed Vice-President of the Canadian Society of Microbiologists. He was also appointed Chairman of the Specialty Committee in Medical Microbiology of the Royal College of Physicians and Surgeons of Canada.

SCHOLARLY ADDRESSES

DR. I.B.R. DUNCAN gave a paper in June 1969 to the Canadian Association of Pathologists entitled "Recognition of Epidemic Strains of Staphylococci in Hospital Infection Control."

DR. S. McDONALD also gave a paper in June to the Canadian Society of Microbiologists entitled "A New Group within the Enterobacteriaceae Family," and in December to the Laboratory Section of the Canadian Public Health Association entitled "A Case of Human Vibriosis."

PUBLICATIONS

FLEMING, P.C. and MURRAY, J.D.M. "'Haemophilus Influenzae Infections'; in *Current Pediatric Therapy*, ed. Gellis and Kagan, p. 817. Philadelphia: W.B. Saunders, 1970.

FLEMING, P.C. *et al.* "Inhibition of Aerobacter Cephalosporin Beta-lactamase" (*Journal of Bacteriology*, vol. 98, 1969, p. 394).

——— "Mycoplasma Pneumoniae as a Determinant of the Guillain-Barre Syndrome" (*Lancet*, October 4, 1969, p. 710).

——— "Spontaneous Mutant with Loss of Beta-lactamase in Aerobacter Cloacae" (*Journal of Bacteriology*, vol. 97, 1969, p. 961).

LEERS, W.-D. "Action of Chloroform on the Haemagglutinin of ECHO Virus Types 7 and 11" (*Archiv für die gesamte Virusforschung*, vol. 28, 1969, pp. 116-21).

LEERS, W.-D. *et al.* "Phycomycosis involving the Intestine and Anterior Abdominal Wall: A Case Report" (*Annals of Surgery*, vol. 171, 1970, pp. 303-8).

——— "Suppurative Thyroiditis: An Unusual Case caused by *Actinomyces naeslundii*" (*Canadian Medical Association Journal*, vol. 101, 1969, pp. 714-18).

MIDDLETON, P.J. *et al.* "Progressive Vaccinia with Chronic Lymphatic Leukemia" (*New Zealand Medical Journal*, vol. 70, 1969, pp. 324-7).

SMITH, A.J. "Ophthalmia Neonatorum in Glasgow" (*Scottish Medical Journal*, vol. 14, 1969, p. 272).

——— "Ophthalmic Infection in Infancy" (*Lancet*, Nov. 1, 1969, p. 954).

TUFFNELL, P.G. *et al.* "Bacterial Decontamination of Polymethyl Methacrylate in Ophthalmology" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 247-57).

——— "Contamination of Trial Contact Lenses" (*ibid.*, vol. 5, 1970, pp. 46-54).

BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Under the direction of Professor I.B. Fritz

INTRODUCTION

The year 1969–70 marked a continuing period of relatively rapid development of activities in the Banting and Best Department of Medical Research. The following new staff members joined the department: Professor James M. Felts; Assistant Professor Bernard P. Schimmer; and Research Associates C. Liang, J. Tomkins, and P.T.S. Wong. Dr. Wong will become Lecturer as of July 1, 1970. The addition of these new staff members was made possible through the availability of positions following the retirement of Professors Erich Baer, W.R. Franks, and C.C. Lucas at the end of the 1968–69 academic year.

SEMINAR PROGRAMMES. OUTSIDE RESEARCH SUPPORT

During 1969–70, seminar programmes were held which served to inform staff members of the researches being done by the BBDMR staff and by the staff from other departments with related interests. This seminar programme also included several outside speakers, many of whom were being evaluated as potential candidates. Journal Club meetings were initiated to discuss findings of papers related to topics of interest to the staff members.

Dr. Alexander Marks has been recruited and will begin his stay as an Assistant Professor in September 1970. Dr. Marks is presently on a Quebec MRC Fellowship at the Institut de Biologie Moléculaire de la Faculté des Sciences de Paris, with Dr. François Gros.

All new staff members were successful in efforts to obtain research support from various granting agencies in amounts sufficient to permit them to equip their laboratories and begin their research programmes.

MRC Associate awards granted to Dr. Clelia Ganoza-Becker and to Dr. A. Kuksis, and MRC Scholar awards granted to Drs. David MacLennan, Francis Rolleston, and Cecil C. Yip continued to be in effect.

BBDMR PROGRAMME IN METABOLIC CONTROL

On March 26, 1970, a proposal to grant departmental status within the School of Graduate Studies to the BBDMR was submitted to Dean Ernest Sirluck.

Lectures and other forms of participation in the regular teaching programmes at the University of Toronto were contributed by nearly all BBDMR staff members to some extent, and Drs. Fritz, Goodridge, Kuksis, Logothetopoulos, Rolleston, Wrenshall and Yip each contributed to various courses offered by the Physiology Department or the Biochemistry Department and/or to the research training of students from these departments. Dr. Fritz collaborated with Dr. Robert Bruce of the Medical Biophysics Department in presenting an advanced course on *Spermatogenesis* in the Spring of 1970 (Biophysics 1001B).

During 1969–70, our departmental staff members supervised the thesis work of three students who fulfilled requirements for receiving the Ph.D. degree (Subbiah and Breckenridge in Biochemistry, and Tung in Physiology). Several staff members have contributed to graduate courses given under the auspices of other departments. We are preparing to offer in 1970–71 a series of courses in Metabolic Control, as outlined in the Programme in Metabolic Control. We are hoping to collaborate with members of other departments, particularly Biochemistry, in these interdisciplinary endeavours.

A BBDMR Graduate Committee was formed, and its members are as follows: Dr. C.C. Yip (Chairman), Dr. J.M. Felts, Dr. J. Logothetopoulos, Dr. D.H. MacLennan, Dr. F.S. Rolleston, and Dr. G. Wrenshall.

RESEARCH

The synthesis of phosphonolipids of biological interest was continued by Professor E. Baer and Dr. H. Basu (phosphonic acid analogues of L- and D-glycerophosphoric acid and phosphatidic acids); Dr. S.K. Pavanaram (phosphonic acid analogues of L- α -(N-methyl) cephalins and their fatty acid-free moiety); and Dr. R. Robinson (phosphonic acid analogues of 2,3-diphosphoglyceric acid, glyceraldehyde-3-phosphate, dihydroxyacetonephosphate and glycerol-1,3-diphosphate). The staff was ably assisted by Mr. H.H. Flehmig.

Dr. Charles H. Best was deeply involved with interviewing medical and graduate students, preparing lectures, appraising applications for research grants and keeping up with the literature.

Dr. Dmytro Buchnea has considerably simplified the preparation of L-mannitol from quebrachitol *via* L-inositol, and has been able to prepare larger amounts of L-mannitol. He is using this polyol as starting material for the synthesis of optically active mixed saturated-polyunsaturated fatty acid diglycerides.

Dr. James M. Felts joined the Banting and Best Department of Medical Research on September 1, 1969. Dr. Felts and two postdoctoral fellows, Drs. Wayne and Rudel, are studying the plasma lipoproteins and their mechanism of assimilation. Three main projects are currently being investigated. The role of the liver in the direct assimilation of chylomicron triglycerides, which are derived from dietary fat, has been studied using intact isolated liver cells and *in vivo* ^{14}C -labelled chylomicrons. Results of this study have greatly clarified the function of the liver in the metabolism of dietary triglycerides. The key enzyme in the assimilation process is lipoprotein lipase, an enzyme situated on endothelial surfaces of peripheral capillary beds. Factors which activate and inactivate this enzyme are currently being studied. Certain lipoprotein fractions of plasma markedly activate the enzyme in the presence of heparin. Inactivation of the enzyme is a function of the liver. The molecular details of these interactions are being sought. Mechanisms of assimilation of chylomicron cholesterol derived from dietary cholesterol are also under investigation. The isolated liver cell system and ^{14}C -cholesterol labelled chylomicrons will also be used in this study. Results of these investigations should provide more insight into the metabolic abnormalities which lead to elevated levels of circulating lipoproteins which are associated with cardiovascular disease.

Dr. Irving B. Fritz directed the following research projects: (a) Dr. J.T. Brosnan continued to investigate the role of the carnitine palmitoyltransferase reaction in fatty acyl group translocation across the inner membrane of liver mitochondria, and examine the mechanisms by which carnitine facilitates the translocation from acyl groups to the intramitochondrial acyl CoA pool. He determined that carnitine penetrated into the total mitochondrial water space under certain defined conditions. A preliminary report appeared in Federation Proceedings, April 1970. (b) Dr. Leo Lee initiated studies on the control of ketogenesis in livers from fetal, neonatal, and adult rats. Maximal ketogenic capacities have been determined, and the probable intracellular sites involved tentatively established. The intracellular heterogeneity of acetyl CoA pools was considered and the levels of activity of carnitine acetyltransferase were measured in livers from rats at various stages of development. (c) Drs. V.L.W. Go and R.G. Vernon are investigating the hormonal control of spermatogenesis in the rat. They have established that carnitine acetyltransferase levels were much higher in spermatocytes than in spermatogonia. The sites of action of FSH and LH on the control of spermatogenesis in the hypophysectomized rat, and the actions of these hormones on carnitine acetyltransferase levels are being investigated. (d) Dr. C. Liang initiated studies on the hepatic metabolism of propional CoA, propionyl carnitine,

and methyl malonyl CoA. Efforts were devoted primarily towards finding suitable analytical procedures for determining the amounts of these intermediates and other acyl-carnitine intermediates in rat livers during different functional states. (e) Mrs. Bozena Kopec purified carnitine palmitoyltransferase, and began to characterize its properties. She also initiated efforts to purify an enzyme tentatively identified as carnitine octanoyltransferase. Her work is designed to provide tools with which to investigate mechanisms of fatty acyl group translocation across mitochondrial barriers in conjunction with projects being conducted by Dr. Brosnan.

Dr. M. Clelia Ganoza and her staff have continued to investigate various aspects of the mechanism of protein biosynthesis. Two approaches were used to define the nature of the intermediates accumulating on ribosomes at various steps of synthesis. The first relies on reconstruction of protein synthesis by purification of the proteins required to start, elongate, and terminate polypeptide chains. The second uses conditional lethal mutants of protein synthesis to accumulate the desired intermediates of the reaction.

Reconstruction: Various assays were previously devised in this laboratory to study the mechanism of codon recognition, cleavage of peptidyl tRNA and dissociation of ribosomal subunits. These are the essential steps of the mechanism of chain termination. Our new findings are that: (1) One protein factor recognizes UAG on mRNA. This factor was purified extensively. Its function was demonstrated by showing that the factor competed with a recognition of UAG by a tRNA from termination suppressing bacterial cells. (2) Another protein, which was separated from other known termination factors, was identified and purified, based on its ability to bind directly to certain terminator codons. (3) Preliminary findings suggest that a ribosomal factor previously isolated in our laboratory is responsible for hydrolysis of peptidyl tRNA on ribosomes. (4) A new soluble protein factor "x" was discovered. The latter is absolutely required for translation with various messenger RNAs.

Genetics: Several techniques were devised for isolating conditional lethal mutants blocked at specific steps of protein synthesis. The latter are being further characterized. Using assays devised in our laboratory, we have, in collaboration with Dr. S. Phillips of the University of Pittsburgh, shown that one conditional lethal mutant of protein synthesis cannot chain terminate and appears unable to dissociate ribosomal subunits. The mutation is due to a lesion in a protein "Z" which has been separated from known initiation, termination, or propagation factors. These observations prove for the first time that: (1) ribosome dissociation is a vital requirement of protein synthesis; (2) an additional protein is required for this step; and (3) an easy means of examining the function of this protein in regulating protein synthesis has been uncovered.

During the past year, Dr. Alan G. Goodridge's staff have continued to study the regulation of lipogenesis during development. Their experimental system has been the liver of embryonic and growing chicks. Dr. Panee Silpananta has purified malic enzyme from chicken liver. Specific antibody has been prepared and Dr. Silpananta is using the anti-malic enzyme to study the regulation of the concentration of this important lipogenic enzyme. Isolated cells have been prepared from chick liver. The cells show all of the properties of liver slices. They are being used to study the mechanism of the "fine control" of fatty acid synthesis. A technique for the long-term culture of these cells is being developed by Mr. Andrew Garay. The development of the fatty acid synthesizing enzymes have also been studied. Two important enzymes, acetyl CoA carboxylase and fatty acid synthetase, develop before the newly hatched chicks are fed. This may be the first demonstration of a non-adaptive increase in the activity of these enzymes.

Dr. Alan A. Horner's main interest continues to be macromolecular heparin. This material isolated from rat skin has a molecular weight of about one million. It has been shown to consist of lower molecular weight heparin chains, held together in a branched structure by a core component which constitutes only 8 per cent of the molecule but is essential to its structural integrity. This molecule has now been isolated from human and monkey tissues also. The ratio of macromolecular heparin to lower molecular

weight heparin varies considerably in different tissues. The lower molecular weight type is probably the physiologically active form, so that these findings may have important physiological significance.

Dr. A. Kuksis made further progress in assessing the physiological significance of various pathways of glyceride biosynthesis demonstrated *in vitro*. Using appropriate radioactive precursors and combined chromatographic and stereospecific analyses, quantitative estimates were obtained of the contributions of the 2-monoglyceride and phosphatidic acid pathways to the resynthesis of dietary fat by the rat intestine (with W.C. Breckenridge, Ph.D. thesis, 1970). By appropriate radioactive markers and exhaustive chromatographic analyses of the metabolic products, a quantitative measure was obtained of the contributions of *de novo* synthesis and acyl transfer to the biogenesis of lecithins and cephalins by rat liver (with B.J. Holub). In collaboration with M.T. Subbiah (Ph.D. thesis, 1970), a series of unnatural bile acids was isolated and identified as products of plant sterol degradation by the rat liver. In co-operation with Dr. I.M. Yousef, an *in vitro* system was developed for the study of the synthesis and release of chylomicrons by isolated mucosal cells. Puromycin was shown to inhibit the synthesis of chylomicrons by isolated cells.

The following research activities have been, or are being, carried out in Dr. John Logothetopoulos' section: (1) The rate of proinsulin and insulin biosynthesis is studied in isolated pancreatic islets. The effects of hormones and metabolites added *in vitro* and of a variety of pre-treatments *in vivo* are also being investigated. (2) The disposal of chylomicron in diabetic rats and the role of lipoprotein lipase in the clearance process. (3) Concentration and characterization of plasma lipoprotein lipase.

Research carried out in Dr. David H. MacLennan's laboratory has been mainly concerned with resolution and reconstitution of the components of the calcium transport system of sarcoplasmic reticulum. An adenosine triphosphatase was purified from sarcoplasmic reticulum through the use of deoxycholate and salt fractionation. Specific ATPase activities of 30 μ moles of ATP hydrolyzed per min per mg protein were routinely obtained but other properties of the ATPase enzyme were unchanged by the isolation procedures. Gel electrophoresis indicates that the preparation has one major protein component. Several properties of the purified enzyme indicate that it is the sole component of the Ca^{++} transport system. (1) the ATPase activity requires Ca^{++} ion; a conclusion deduced from the fact that ATPase activity in the presence of Mg^{++} is completely inhibited by EGTA, a chelator with great specificity for Ca^{++} . The Ca^{++} requirement appears to be largely met by Ca^{++} which is bound to the enzyme at levels of 12–13 $\text{m}\mu$ moles per mg of protein. (2) A phosphorylated protein, which has been implicated in the Ca^{++} transport reaction, can be detected following incubation of the ATPase with ATP labelled in the terminal position. The enzyme also catalyzes an ATP-ADP exchange which appears to result from the interaction of ADP, ATP, and the phosphorylated intermediate. Phosphorylation levels and the exchange rate are purified commensurate with the purification of ATPase. (3) The purified enzyme contains phospholipid in amounts comparable with that found in sarcoplasmic reticulum. When the enzyme is made insoluble by removal of deoxycholate, hollow spherical vesicles are formed. These vesicles resemble those of sarcoplasmic reticulum, except that they have a smooth surface rather than a rough one. The reformed vesicles have the capacity to bind Ca^{++} at levels of about 120 $\text{m}\mu$ moles per mg protein – one tenth the level of sarcoplasmic reticulum. Ca^{++} accumulation in the reformed vesicle, as in sarcoplasmic reticulum, is dependent on addition of both ATP and an anion, such as oxalate, which will form an insoluble Ca^{++} salt. Current work in Dr. MacLennan's laboratory is aimed at improving the Ca^{++} loading ability to a level comparable with that of sarcoplasmic reticulum, either by improved preparation or by the addition of factors removed during purification of the ATPase. In addition, studies of the Ca^{++} binding site of the enzyme are being initiated.

Work is continuing in Dr. S.S. Mookerjee's laboratory on the relationship of glycoprotein metabolism in plasma lipoprotein biosynthesis. A stimulation of plasma glycoprotein synthesis and a reduction of liver triglycerides in 2-days choline-deficient

rats were observed within two hours of phosphorylcholine administration. A more striking effect of phosphorylcholine on the incorporation of glucosamine into medium proteins was found in liver slices. Assay of UDP-N-acetyl glucosamine : glycoprotein N-acetyl glucosaminyl transferase activity in the golgi-depleted membrane fraction showed a decrease in choline-deficient liver. A marked stimulation of the enzyme activity in the same membrane fraction was observed by *in vitro* additions of phosphorylcholine plus cytidine-5'-triphosphate or cytidine-5'-diphosphocholine. Work is in progress to test the postulation that phosphorylcholine turnover in microsomal membrane lecithin has a general catalytic effect on some of the membrane functions.

Dr. Francis S. Rolleston's staff are studying the binding of ribosomes to the endoplasmic reticulum. Membrane-bound ribosomes in rat liver synthesize a different group of proteins from free ribosomes. Hypotheses to explain these functional differences between two groups of ribosomes apparently sharing a common cytoplasmic pool of substrates are that the messenger RNA or nascent peptide dictate whether binding shall occur, or that there is a difference between the two groups of ribosomes which selects for membrane binding independent of message or nascent peptide. Work to date has shown that label from ribosomes can bind to rough and to smooth endoplasmic reticulum, that the membranes can become saturated with ribosomes, and that, with excess membranes, approximately 15 per cent of the label from ribosomes will attach. Preliminary experiments indicate that puromycin pre-treatment of ribosomes reduces their binding to membranes, and that there is no selectivity under the conditions tested of binding of free or bound ribosomes to the membranes. This early evidence therefore favours the hypothesis that the messenger RNA or nascent peptide direct binding of ribosomes to membranes.

Dr. Bruno Rosenfeld has explored the possible role of hepatic nuclear phospholipids as repressors in the formation of messenger RNA leading to the biosynthesis of lipogenic enzymes and has postulated that dietary choline may exert a control of lipogenesis by influencing the relative distribution of choline – versus non-choline – bearing phospholipids that are associated with the chromatin of the cell nucleus. In testing this hypothesis, evidence has been obtained that a single feeding and, still more so, two feedings of a choline-deficient diet increased the level of phosphatidylethanolamine and, at the same time, decreased that of phosphatidylcholine in rat liver nuclei. Whether or not the minor phospholipids, phosphatidyl inositol, and phosphatidyl serine likewise participate in the changes caused by dietary choline is still under investigation. An analytical procedure has been worked out to measure with precision these minor phospholipids.

The problem under study in Dr. Bernard P. Schimmer's laboratory is the nature of the sites and mechanisms of adrenocorticotrophic hormone (ACTH) action on adrenal steroidogenesis. Of major interest is adenyl cyclase, an enzyme thought to mediate at least some of the effects of ACTH on the adrenal. This problem is being studied in ACTH-sensitive adrenal cell cultures and in mutants of the adrenal cell line with specific lesions in the ACTH-stimulated steroidogenic pathway.

In the long-fasting obese grown dog, Dr. G.A. Wrenshall and his staff are studying the paradoxical excess in the tracer-determined rate of production of unlabelled glucose over the gluconeogenic potentials represented by protein catabolism *plus net* triglyceride glycerol release. Present activities include measurement of glucose turnover, the rate of oxidation of plasma glucose to carbon dioxide, and related factors by tracer-injection and biochemical procedures. In collaboration with Dr. M. Vranic (Department of Physiology), the roles of insulin secretion rate and exercise on glucose turnover in grown dogs is being studied. Tracer-determined glucose production is found to be rapidly increased during exercise, independently of insulin and pancreatic glucagon. In the fasting depancreatized dog receiving intraportal insulin, need for extra insulin release to provide glucose homeostasis is seen during muscular activity. Miss Marion Bicknese was granted an M.Sc. degree in October of 1969, under the supervision of Dr. Wrenshall.

Research carried out in Dr. Cecil C. Yip's laboratory included the following:

(1) The biosynthesis of insulin is now known to proceed through the initial synthesis of a single-chain polypeptide proinsulin. An enzyme preparation has been obtained from pancreatic extract which catalyzes the *in vitro* conversion of the single-chain proinsulin to intact insulin via the double-chain intermediate. The product of this conversion has been identified as intact insulin by polyacrylamide gel electrophoresis, high-voltage paper electrophoresis, amino acid analysis, carboxyl terminii determination, and hypoglycemic effect. The enzyme preparation has been purified by ammonium sulphate precipitation, gel filtration, and isoelectro-focusing. Further purification steps are under way to obtain a homogeneous preparation. The immunohistochemical localization of this enzyme in the pancreas will be attempted.

(2) Experiments have been done to study the synthesis of proinsulin in cell-free systems using polyribosomes prepared from fetal calf pancreas. Preliminary results of these experiments showed that radioactive leucine was incorporated into polypeptides behaving like proinsulin and insulin.

(3) The peripheral conversion of proinsulin to insulin is currently being investigated. *In vivo* experiments in whole animals showed that the double-chain intermediate proinsulin, labelled with radioactive iodine, did not give rise to radioactive insulin in the peripheral circulation under fasting, hypoglycemic, or hyperglycemic conditions. Extracts of several tissues from animals receiving radioactive proinsulin demonstrated an apparent conversion of proinsulin to insulin at the tissue site of action. Detailed studies of this aspect are under way.

(4) Immunoassays of insulin and proinsulin have been used to determine the level of insulin and proinsulin in extracts of fetal calf pancreas at various stages of gestation in an attempt to correlate the age of the fetus with the appearance of proinsulin and insulin in the pancreas.

(5) A homogeneous preparation of guinea-pig insulin has been obtained from guinea-pig pancreas by an extraction procedure developed in Dr. Yip's laboratory. Experiments are under way to study and compare the biological activities of the guinea-pig insulin in several *in vitro* heterologous or homologous systems. Preliminary results indicate that guinea-pig insulin is only about one eighth as active as bovine insulin in producing hypoglycemia in rabbits and in the mouse convulsion assay.

(6) The biosynthesis of proinsulin and insulin in fish (cat fish) is being investigated with respect to the effect of temperature and acclimatization. Results obtained thus far have shown a sharp temperature effect *in vitro* on the biosynthetic process.

HONOURS

PROFESSOR EMERITUS C.H. BEST was reappointed to a further two-year term as member of the World Health Organization Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations. He was reappointed to the Committee on Research of the American Diabetes Association, and was appointed by the Council of the International Union of Nutritional Sciences to the Committee on Diabetes and Cardiovascular Diseases of Special Nutritional Importance; The Charles H. Best Annual Lecture was established by the Toronto Diabetes Association.

PROFESSOR I.B. FRITZ was chosen as a distinguished lecturer for the "Distinguished Lecture Series" held at the University of Rochester, Rochester, New York.

PROFESSOR A. KUKSIS was elected Fellow of the Council on Arteriosclerosis of the American Heart Association.

SCHOLARLY ADDRESSES

PROFESSOR C.H. BEST, "The History of Insulin," the George W. Corner Lecture of the University of Rochester, Rochester, New York; "Diabetes and Insulin – the Present Situation," at the Cooperative Diabetes Teaching Course of the Joslin Foundation and the Massachusetts College of Pharmacy, Boston, Massachusetts.

PROFESSOR J.M. FELTS, "Lipoproteins and their Metabolism," to the Japanese

Society of Lipid Research, Fukuoka, Japan, and to the Japanese Oil Chemists' Society, Osaka, Japan; "Chylomicron Metabolism in Isolated Liver Cells," to the Laboratories of Clinical Chemistry, Medical School of the Free University of Brussels; "Comparative Aspects of Lipoprotein Lipase," to the Department of Experimental Medicine, Medical School of the Free University of Brussels.

PROFESSOR I.B. FRITZ, "A Survey of the Role of Carnitine in Fatty Acid and Intermediary Metabolism," to the Japanese Society of Lipid Research, Fukuoka, Japan, and to the Japanese Oil Chemists' Society, Osaka, Japan; "Regulation of Lipid Metabolism," to the Department of Biochemistry, University of British Columbia, Vancouver, B.C., during a two-week period as "Visiting Professor"; also conducted seminars at the University of Toronto (Department of Physiology), the University of Rochester and Syracuse University on various relationships among fatty acid oxidation, gluconeogenesis, and carnitine.

PROFESSOR M.C. GANOZA, "Further studies on polypeptide chain termination *in vitro*," to the Cold Spring Harbor Symposium of Quantitative Biology; "Proteins to End All Proteins," to the Department of Medical Cell Biology, University of Toronto; "Reconstruction of Protein Synthesis," to the Department of Biochemistry, McMaster University, Hamilton, Ontario; "Discussion of the Symposium on Protein Synthesis," to the Canadian Federation of Biological Society, Montreal, Quebec.

PROFESSOR A.G. GOODRIDGE, "Latent Enzyme for the Synthesis of Fatty Acids in Chick Liver," to the Canadian Federation of Biological Society, Montreal, Quebec.

PROFESSOR D.H. MACLENNAN, "Isolation and Characterization of the Adenosine Triphosphatase of Sarcoplasmic Reticulum," to the Canadian Federation of Biological Society, Montreal, Quebec.

PROFESSOR S.S. MOOKERJEA, "Fatty Liver," to the Department of Pathology, University of Toronto; "The Action of Choline in Lipoprotein Metabolism," to the Federation of American Societies for Experimental Biology, Atlantic City, N.J.; "Effect of Phosphorylcholine on Glycoprotein Synthesis," to the Glycosaminoglycan-glycoprotein Group, Boston University Medical School, Boston, Mass.

PROFESSOR B.P. SCHIMMER, "Studies of Differentiated Function in Cell Cultures," to the Annual Clinical Research Society of Toronto, Toronto, Ontario.

PROFESSOR C.C. YIP, "The Biosynthesis and Conversion of Proinsulin," to the Department of Biochemistry, McMaster University, Hamilton, Ontario; "The Biosynthesis and Conversion of Proinsulin," to the Toronto Biophysical and Biochemical Society, Toronto, Ontario; "The Conversion of Proinsulin to Insulin," to the Toronto Diabetes Association, Toronto, Ontario.

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DIVISION OF BEHAVIOURAL SCIENCE

Under the direction of Professor R.F. Badgley

OVERVIEW

In July 1968 the first full-time faculty appointments in Behavioural Science became effective in the Faculty of Medicine. During the first year (1968-69) a nucleus of staff worked on the development of the curriculum. During the past academic year, with additional colleagues, the major concern has been with the introduction and implementation of the Behavioural Science curriculum to first-year medical students and the offering of a limited number of electives for students throughout the four-year course.

Before going into some of the details about the year's activities, it may be useful to place what is being attempted in the context of broader developments. The momentum of interest in the fusion of behavioural science and medicine, not only in Canada but elsewhere, has grown sharply. As seen through the selective lens of the members of this programme, they have variously taken part in: the planning and implementation of the First Workshop on Social Science and Health in Canada (June 1969) and the second workshop in Winnipeg (June 1970); the collation of a volume summarizing reports on the current state of Behavioural Science and Medicine in Canada (to be published in July 1970); a series of workshops on the teaching of Behavioural Science and Medicine in the United States sponsored by the u.s. National Center for Child Health and Human Development; a national study focusing on the teaching of behavioural science in medicine in Canada and the United States sponsored by the u.s. National

Center for Health Services Research and Development; and a consultancy on an invitational conference on behavioural science and health sponsored by the Association of Indian Faculties of Medicine (October 1969). Additional prominence to this fledgling field has been given by the U.S. National Board of Medical Examiners by its intent to introduce, effective April 1971, in its Part 1 Examination, questions relating to behavioural science content. It is in the context of these developments that the work undertaken during the past year in Behavioural Science may be interpreted.

Staffing

In introducing behavioural science into a medical curriculum, several institutional alternatives are possible. At the one extreme, instruction may be given by physicians in this field without any or minimal commitment by social scientists; at the other extreme, a semi-autonomous unit (either a division or department) operating with minimal involvement by physicians might be considered. In this faculty a blending of these two possibilities has been effected in the presentation of the curriculum and a beginning made in this direction in its staffing. At the present time, the full and/or part-time complement of this programme includes four sociologists, four psychologists, two medical associates, and three teaching assistants. Because of the paucity of psychologists and sociologists working in the medical field, initial efforts were made towards seeking out those who were competent "two-way players" – retaining excellence in their own field while also having a willingness to work in a different professional setting. This phase has now been accomplished. What is required next is to complement the efforts of this staff with those of physicians already on the faculty or members of the related teaching hospitals. Because of the friendly links which have already been established with several of these hospitals, this type of liaison can be expected to grow during the coming year.

At the level of student instruction, heavy reliance has been placed on interdisciplinary, collaborative efforts. Less than 10 per cent of formal sessions (lectures, panels, demonstrations, field trips, etc.) were undertaken solely by psychologists and sociologists; in the remainder (90 per cent), instruction was provided by both behavioural scientists and physicians. In each instance, these efforts represented an initial collaborative dialogue, a dialogue which can be expected to become more mutually relevant and effective as a mode of teaching in the future.

Although the initial commitment in accreting a staff in Behavioural Science was made by the Faculty of Medicine, this enterprise was undertaken in the spirit that such a grouping through time would relate to other departments and faculties within the university and to the related teaching hospitals. At the present time, through multiple cross-appointments, members of Behavioural Science are linked to: the Graduate School (Departments of Psychology and Sociology); the Department of Paediatrics; the Department of Medicine; the Department of Psychiatry; the Clarke Institute; the Toronto General Hospital; St. Michael's Hospital; and the Institute for Child Study. Discussions with the staff of the Faculty of Dentistry have led to a cross-appointment of a staff member between Behavioural Science and that faculty, with a view to developing a specific programme in Behavioural Science relevant to dentistry. With the appointment effective July 1970 of a pharmacist-psychologist, it is likely that through time another such cross-appointment will develop between this programme and the School of Pharmacy.

At the graduate level, instruction is now being given in three seminars (psychology, sociology) and a number of Ph.D. candidates are undertaking dissertation research in areas related to social science and health.

Theodore D. Kemper has accepted a post at Queens College of the City University of New York. His contribution to the development of the curriculum was creative and substantive and will be missed in the future. David Gardiner and Ian Sone have left the programme as teaching assistants. New appointments for 1970–71 include: Jack Parlow (pharmacology, Ph.D. in psychology, 1970); and Elizabeth Cape (social work, sociology).

Curriculum Planning and Implementation

During the academic year 1969–70 sixteen staff meetings were devoted to curriculum planning, evaluation and revision which culminated in a day and a half Retreat in May 1970. From these various meetings consensus has emerged concerning the objectives of the Behavioural Science curriculum and its implementation. These detailed staff meetings have been complemented by meetings of the Behavioural Science Curriculum Committee (composed of several members of the programme of Behavioural Science as well as representation from the departments of Paediatrics, Medicine, Psychiatry, and the School of Hygiene) and a series of detailed curriculum review topic meetings with medical students. Following the Retreat in May, a meeting with representatives of first-year Medicine was held to review further the plans for the curriculum for 1970–71.

Of the several trends which have emerged from these meetings, the most significant is the growing confidence that professionals of different backgrounds (medicine, psychology, sociology, etc.) can effectively work and plan together, although there are numerous differences in professional outlook and educational philosophy. While the staff has been intensely aware of these issues, a curriculum has emerged which, while stressing several central issues, has, as well, developed into four or five discrete components. The programme has relied heavily on the generous commitment of time by well over 100 physicians, either in the classroom or in the teaching hospitals. Moreover, medical students have taken an active part in moulding the curriculum through at least eight meetings, considering the curriculum as a whole or in its component parts. In an end-of-term course evaluation, numerous useful suggestions were made by students dealing with specific aspects of the curriculum, new topics to be offered, restructuring of lectures and seminars, and readings. While there are no appropriate guidelines to judge performance, 80 per cent of the students rated the course during the previous year as average or above average.

Because there are no established curriculum models in this area, major difficulties have revolved around finding appropriate texts or readings and videotape illustrative materials. Strenuous efforts have been made and are being continued to complement instruction by appropriate visual aids. An informal "textbook," which will be drawn from numerous sources, will be assembled for students effective September 1970.

Electives and Graduate Studies

From a modest start in 1968, there has been a gradual development of graduate studies both for physicians and behavioural scientists. Two fourth-year medical students who took electives in Behavioural Science have indicated an active interest in continuing studies in this field during their internships in local hospitals. Staff members have addressed a programme on Health Services, Organization and Administration sponsored by the School of Hygiene for senior medical personnel drawn from across Canada as well as a programme of Continuing Education for Family Physicians sponsored by the Division of Postgraduate Medical Education of this university. One physician who is an Associate in this programme completed studies during the year in the organization of health services at Yale University; it is expected that he will work closely with members of the programme to extend joint interests for medical students, interns, and residents at his hospital, where he has been appointed Director of Out-Patient Services.

Despite the alarm which has often been expressed about the Americanization of Canadian faculties and student bodies, there has been, until recently, a shortage of Canadian-trained Ph.D.s in sociology and psychology. In the former field, for example, only five Ph.D.s in sociology have been granted in Canada during the past six years. At the present time, for a variety of reasons, there is an increasing pool of students taking graduate studies in both of these disciplines. Members of Behavioural Science are now serving as faculty advisors or supervisors to five or six Ph.D. candidates, several of whom are studying health-related topics, e.g., the role of occupation on the perception and use of health services; the administrative structure of hospitals and nursing turnover; the perception of sickness and pain in seeking health care, etc. An additional

four students who are now completing their course requirements are likely to undertake dissertation research in similar areas. While no formal training programme analogous to those sponsored by the U.S. National Institutes of Health has evolved, a less structured training counterpart is developing from which potential teachers and researchers may emerge within the next few years.

VISITORS

Stanley Best, M.D., Professor, Maternal and Child Health, School of Public Health, University of Michigan, Ann Arbor; Neil E. Collishaw, M.A., Research Associate, Association of Canadian Medical Colleges, Ottawa; Anne Crichton, Ph.D., Department of Health Care and Epidemiology, University of British Columbia; Raul Derticos Torrado, M.D., Dean, Faculdade de Medicina, Universidade de Habana, Cuba; Halmend C. Dyer, M.D., Department of Social and Preventive Medicine, University of the West Indies, Mena; G.P. Evans, M.D., Medical Consultant, Health Manpower Resources, Department of National Health and Welfare, Ottawa; John Hay, M.D., Professor of Family Medicine, McMaster University, Hamilton; Conrad Harris, M.B., Lancashire, United Kingdom; Henry P. Kedward, M.B., Associate Dean of Medicine, Memorial University of Newfoundland, St. John's; L. Levine, M.D., Brooklin Medical Centre, Brooklin, Ontario; Alexander E. MacLeod, D.D.S., Faculty of Dentistry, Dalhousie University, Halifax; Ian MacWhinney, M.B., Professor of Family Medicine, University of Western Ontario, London; Hans O. Mauksch, Ph.D., Professor and Head, Section of Health Care Studies, School of Medicine, University of Missouri; John McMullen, M.B., Amersham, United Kingdom; Affonso Renato Meira, M.D., Professor of Social Medicine, Universidade de Brasilia, Brasilia; John Owen, M.B., Department of Social and Preventive Medicine, University of Saskatchewan, Saskatoon; Alexander D. Robertson, M.D., Program of Human Resources Development, Pan American Health Organization, Barbados; Ailon Shiloh, Ph.D., Professor of Anthropology, School of Public Health, University of Pittsburgh, Pittsburgh; N. Taquechel, M.D., Director, Departamento de Medicina, Escuela de Medicina, Universidade de Habana, Cuba; Alan Torrie, M.D., Lake of the Woods Clinic, Kenora; Samuel Wolfe, M.D., Professor of Family and Community Medicine, Meharry Medical College, Nashville.

RESEARCH

This summary represents those studies which are in progress, but not a complete inventory of studies which are in the process of being planned or which have been submitted for grant support.

Psychological and Physiological Processes

(1) *Development of Social Schemata in Children*: A discipline investigation of the age at which children acquire socially defined norms for the structuring of social situations.

(2) *Limbic System and Behaviour*: Motivational and cognitive functions of the mammalian limbic system. Effects of selective ablations on emotional behaviour, fluid regulation, and learning.

(3) *Neural Mechanisms of Learning and Memory*: Temporal and ordinal relations between behavioural indices of memory consolidation and the psychological mechanisms which may direct or mediate information storage and retrieval. In particular, this study deals with (a) behavioural functions of cerebral RNA and protein synthesis and the effects, on learning and memory, of compounds which stimulate or inhibit these processes, and (b) the experimental production of anterograde and retrograde amnesia by electroconvulsive shock and drugs.

(4) *Plasticity in the Autonomic Nervous System*: Instrumental control of autonomic effectors. This work is still in the planning stage. It will involve training animals in the

“voluntary” control of certain autonomic mechanisms (e.g., blood pressure, acid-base balance) and will be extended, eventually, to human subjects.

(5) *Self, Role and Others: A Study in Social Psychology*: Research monograph in process reporting results of research programme sponsored by Russell Sage Foundation, New York, in Social Psychology, publication 1970.

(6) *Sucking for Arbitrary Outcomes in Human Infancy*: The purpose of the study: (a) to investigate visual reactions to focus and non-focus, a visual dimension which has been ignored by psychologists. These results refute the belief that babies see their surroundings as a blur. They suggest that even at infancy the cells of the visual cortex probably respond to sharp edges and contours; (b) to see to what extent the infant can gain control over his sucking, which is a relatively stereotyped, reflexive activity used only for the purposes of gaining nutriment and/or comfort. The results indicate that an infant can control his sucking and can use it for arbitrary ends. Control of sucking consists of controlling the length of the pauses between bursts of sucking, while the length of the bursts remain relatively unchanged.

The Community as a Laboratory

(7) *Development of a series of Interrelated Projects Concerned with the Delivery of Health Care in an Urban Setting*: This project includes three studies: the Hospital and the Community, focusing on the impact of the hospital on community health care; Health Manpower, assessing current medical roles and suggesting potential reassignment of functions toward improved medical care; the Patient, the Nurse and the Doctor, an analysis of communication patterns and the impact of those patterns on the outcome of medical treatment. Two faculty members from Behavioural Science have worked with an interdisciplinary committee made up of medical staff in the Department of Medicine and the Family Practice Unit at Toronto Western Hospital, as well as members of the faculty of the University's School of Nursing, to develop this research programme which is still in the process of being formulated. A specific project involving medical and nursing students was initiated in June 1970, focusing on some of these research objectives.

(8) *Elite Structure of Toronto: Ethnic Composition and Patterns of Recruitment*: This study tests sociologist John Porter's conclusion that elite positions in Canadian society are held almost exclusively by Anglo-Saxons, through analysis of the ethnic composition of Toronto's elite structure. The hypothesis was that the swift pace of development and change had been accompanied by alterations in recruitment patterns to elite positions and by a weakening of the Anglo-Saxon monopoly on elite status. The major finding was that while the need for trained specialists has been reflected in an increase in the proportion of non-Anglo-Saxons admitted to major functional roles, admissions to the core elite (nucleus or apex of the elite structure) has not been accorded to non-Anglo-Saxons. Publication by McClelland and Stewart, Toronto 1970.

Health Services and Social Policy

(9) *Family Doctor*: This longitudinal study (1962–68) of the work of a group of doctors is an analysis of the doctor's work, the fees derived, the time spent, his prescribing habits, the medical conditions seen, the use of hospitals, findings on check-ups, the extent of preventive services, and house calls and referral patterns. Analyses have been made to learn the relationships between the social characteristics and the patterns of visits by both patients and their families. The extent to which a family doctor looks after families is analysed as well as which individuals use the services of a particular group of doctors and other services. Sub-studies relating to family attitudes, an extensive review of the literature, the use of a social worker, and the doctors prescribing practices have been completed. A book entitled *The Family Doctor* is to be published by Atherton Press, New York City.

(10) *Health Manpower Studies*: The concepts, methods, and implications of manpower studies, and in particular, those relating to health manpower are analysed from the perspective of a health service system. Initial reports have been prepared for the

Health Manpower Branch, u.s. National Center for Health Services Research and Development and a World Health Organization sub-committee.

(11) *The Health of Yorkville*: This project (funded by the Ontario Department of Health) is designed to study the health problems of young people in Toronto designated as "hippies," who are not being reached by, and are not availing themselves of, traditional health services. The focus of the study is on the health status of the "hippie" population, both as clinically appraised and self-perceived. An extensive survey of over 500 youths was undertaken in 1969 and a final report is due in 1970.

HONOURS

R.F. BADGLEY, Visiting Lecturer, School of Public Health, Columbia University, New York; Visiting Lecturer, School of Public Health, Yale University, New Haven; Associate Editor, *Journal of Health and Social Behaviour*, 1969 – .

M.J. KELNER, member, Second and Third Conferences on Behavioural Science and Medical Education (by invitation of u.s. Government, Department of Health, Education and Welfare, National Institutes of Health), Boiling Springs, Pa., May 1970.

T.D. KEMPER, special consultant, Association of Indian Faculties of Medicine, New Delhi, October 1969.

SCHOLARLY ADDRESSES

R.F. BADGLEY, Section Chairman on Health Manpower, Conference on International Studies on Medical Care, American Sociological Association and u.s. National Center for Health Services Research and Development, Asilomar, August 1969, Proceedings and position papers to be published in *Medical Care*, 1970; "Social Science and Health Planning," 83rd Annual Conference of State and Territorial Health Authorities, Philadelphia, November 8, 1969; "Group Medical Practice: A Sociological Perspective," First International Congress on Group Medicine, Winnipeg, April 1970.

R.F. BADGLEY and S. WOLFE, "Public Policy and Multiphasic Automated Testing for Health," Invitational Conference on Automated Multiphasic Health Testing and Services, u.s. National Center for Health Services Research and Development, Washington, January 1970.

R. COHEN, panelist, Medical Sociology Section, Canadian Learned Societies, Winnipeg, May 30, 1970.

G.E. FINLEY, "Attitude-recognition Consistency as a Stimulus Processing Mechanism in Children," the 1969 Biennial Meeting of the Society for Research in Child Development, Santa Monica, March 26–29, 1969.

L.J. GOLDSMITH, "Behaviour of Captive and Domestic Rodents," Canadian Association of Laboratory Animal Science, Edmonton, September 1969.

M.J. KELNER, "A Sociological Case Study on Health Services Delivery," University of Toronto Advanced Programme in Health Services Organization and Administration, Part II, March 9, 1970.

T.D. KEMPER, "The Two Fundamental Dimensions of Social Interaction," American Sociological Association, San Francisco, September 1969; "Teachers of Social Science in Schools of Medicine," keynote address at conference on the Teaching of Social Science in Schools of Medicine, New Delhi, October 1969.

PUBLICATIONS

BADGLEY, R.F. "Health Manpower Education"; in *Proceedings of National Manpower Conference*, 1969, pp. 195–7. Ottawa: Department of National Health and Welfare, 1970.

——— "Health Manpower in International Perspective" (*Milbank Memorial Fund Quarterly*, vol. 48, April 1970, pp. 204–18).

BADGLEY, R.F. and BLISHEN, B.R. Review, *Journal of Health and Human Behavior*, vol. 11, March 1970, p. 79.

GUCCIONE, Miss M.

"The Interaction of Platelets with Adenosine Diphosphate"

KENNEDY, Miss T.D.

"5-Carboxymethyluridine Methyl Ester, a Trace Nucleoside Constituent of Yeast transfer RNA"

KIRBY, E.J.

"The Role of Methionine in the Regulation of RNA Synthesis in *E. coli*"

SHIMADA, W.

"Isolation of Desmosine- and Isodesmosine-containing Peptides from Elastase Digest of Elastin"

SIREN, K.P.J.

"A Phase Study of the System: Hexadecan-1-ol-Methanol-Water"

WILLS, M.C.

"Proton Binding by Phosphatidyl Inositol"

YOGESWARAN, G.

"Biochemical Studies of the Lipids of Mammalian Cells in Tissue Culture"

B.Sc. (Med.) degree

MORRISH, B.

"The Lipid Particles of Ehrlich Ascites Tumour Cells"

RESEARCH

In Dr. Anwar's laboratory, Mr. N.R. Davis has completed his studies on the mechanism of formation of desmosine and isodesmosine cross-links of elastin. Mrs. A. Bowman demonstrated that the technique for cleaving the pyridinium ring of desmosine and isodesmosine (previously developed in this lab.) can be applied to the desmosine and isodesmosine containing peptides obtained from elastin. This technique is currently being used by Mr. G. Gerber and Dr. G. Kemp to study the structure of these peptides isolated from elastase digest of elastin. Mr. A. Taku has partially purified UDP-Glc NAC-pyruvate reductase and studied some of its properties. He has established that this enzyme is a flavoprotein. Kinetic and binding studies (Mrs. J. Sodek) carried out on pyruvate-UDP-Glc NAC transferase suggest that the binding of P-enolpyruvate requires the prior binding of UDP-Glc NAC. Sufficient quantities of UDP-Mur NAC-tripeptide (required for our studies on cell wall biosynthesis) have been isolated (H. Takeda) from oxamycin inhibited *B. cereus*.

In Dr. Connell's laboratory Miss Parr and Mrs. Percy have studied an atypical myeloma protein and have shown that the light and heavy chains have extensive "deleted" sections within the variable region. Mrs. Buchwald has continued her study of the role of -SH groups in immunoglobulins. Mr. Ofosu has shown that two enzymatic fragments of haptoglobin bind hemoglobin co-operatively, while neither fragment alone has binding activity. Mrs. Adamson has completed the characterization of γ -glutamyl cyclotransferase. Dr. Bennick has studied the properties of four proteins of parotid saliva. These proteins all have low molecular weights (*ca.* 10,000) and unusual amino acid compositions.

The research carried out in Professor J. Manery Fisher's laboratory was largely devoted to a study of the properties of the external membrane of cells. With the assistance of Mr. S. Madapallimattam and Mrs. E.E. Dryden, investigations were continued of the relation of the characteristics of the isolated (Na + K) Mg ATPase of skeletal muscle to cation transport in muscle cells. With Dr. Hugh Middleton data were obtained on the (Na + K) Mg ATPase of kidney and muscle which support his model of the enzyme. In her investigation of the chemical nature of the calcium-binding group in the red cell membrane, Dr. J.F. Forstner showed that blocking of the free carboxyl groups with cyclohexylcarbodiimide greatly reduced the amount of calcium bound; removal of sialic acid has no effect.

Mrs. Ambus, with the assistance of Mrs. Dryden, obtained convincing evidence that the L(+)- and D(-)-isomers of lactate do not enter muscle cells solely by simple diffusion; insulin stimulated the production of CO₂ from the unnatural D(-)-isomer about half as much as that from L(+)-lactate. Mr. J.R. Riordan investigated the

permeability of muscle cells to adenine and hypoxanthine derivatives; the data suggested that AMP and IMP entered muscle cells but at a slower rate than adenosine.

In Dr. Hofmann's laboratory, Dr. Dzialozinski completed his study on the binding properties of substrate analogues to pancreatic elastase. Miss Safia Wasi has continued her study of the pH dependent conformational changes of pancreatic elastase. Mrs. Rao has completed a study of the derivatives of elastase and the reactivity of various groups of elastase and has also started work on the amino acid sequence of penicillopepsin. Mrs. Grossman has confirmed the essential nature of the N-terminal amino group for catalysis by elastase. Mr. Kurosky has completed his study on the kinetics of reactions of amino terminal groups in model compounds. Mr. Sodek has continued his studies on penicillopepsin and has isolated the active site peptide; it is almost identical with the active site peptide of porcine pepsin. Mrs. Gray has completed a study of the partial cleavage of penicillopepsin at the active site. Mr. Mains has initiated a study of the kinetics and the specificity of penicillopepsin. Mr. Jones has successfully crystallized penicillopepsin in preparation for an X-ray analysis and has also recrystallized penicillopepsin which is covalently inhibited at its active site. Dr. Harris has joined the group and is completing his previous work on the amino acid sequence of horse trypsinogen.

In the laboratory of Dr. E.R.M. Kay work is in progress on aspects of tumour metabolism. Mrs. I. Gower, who joined the laboratory in October 1969, has been studying the effects of various histone fractions on nuclear metabolism of the Ehrlich ascites carcinoma. Dr. N. Islam has devoted much of his time to the study of the metabolism of nucleotide-peptides, which he has discovered to be present in tumour cells. Concurrently with this work Dr. Islam has developed a new procedure for the preparation of soluble RNA, and has studied the effects of Vinblastine in tumour cells. Mr. H. Pushie has continued his studies of tumour-cell nuclear RNA, using sucrose gradient centrifugation and gel electrophoresis studies.

In the laboratory of Dr. B.G. Lane, Dr. David Streeter has completed a study of the specificity of S-adenosylmethionine- N^2 -dimethylguanylate transferase from wheat embryo, using both *E. coli* and wheat embryo transfer ribonucleates as substrates. Dr. Streeter has initiated a study that is designed to obtain a purified preparation of the wheat embryo methyltransferase which is specific for the formation of N^2 -dimethylguanylate. Miss Theresa Tumaitis has completed her study of the biogenesis of 5-carboxymethyluridine methyl ester. Miss Kathleen Olver has made progress in her attempts to characterize the terminal nucleoside residues of the high molecular weight ribonucleates from yeast cells. Mr. Tai Kwong has characterized 2-thio-5-carboxymethyluridylate and its methyl ester, which are derived from yeast transfer RNA. Mr. Raymond Lau has studied the sequence distribution of $O^{2'}$ -methylribose in each of the 16S and 28S components of yeast ribosomal RNA. Mrs. Patricia Bronskill has provided skilful assistance to Miss Tumaitis and Mr. T.C. Kwong.

The work in Professor Murray's laboratory is centred around biochemical aspects of the cytoplasmic membranes of normal and malignant cells using two principal systems – murine liver and cells grown in tissue culture. Mr. Bailey is investigating the protein constituents of the rat liver microsomal fraction, utilizing a urea-starch gel electrophoretic system. Miss P. Cheema is investigating the ganglioside pattern of mouse liver and examining various aspects of the structure and biosynthesis of gangliosides in liver. Mr. Chatterjee and Mr. Yogeeswaran are studying various aspects of the membranes of cultured cells, particularly mouse embryo fibroblasts, L cells, and Hela cells.

In Dr. Packham's laboratory, further studies of blood platelets have been carried out with the co-operation of Miss Maria Guccione and Dr. Charles Jenkins, and with the technical assistance of Mrs. Puay Lim Chang. At the platelet membrane, C^{14} -ADP has been found to be converted mainly to C^{14} -ATP in suspensions of washed platelets from rabbits. The enzyme responsible for this conversion has been identified as nucleoside diphosphokinase and some of its properties have been investigated. Release of ATP from platelets upon stimulation with ADP has been demonstrated. The effects of poly-

lysine on platelets have been studied, and the observations of the adherence of platelets to surfaces have been extended.

In Dr. Painter's laboratory, Mr. J. Minta is carrying out an examination of the Fc portion of the immunoglobulin G molecule, with the assistance of Mr. S. Assimeh. The study is proceeding along three lines: (1) an investigation into the basis of the heterogeneity found in the electrophoretic patterns of Fc, (2) correlation of the biological properties remaining in sub-fragments of Fc with the amino acid sequence in the sub-fragments, (3) in collaboration with Mr. L. Pinteric a study of the crystal structure of immunoglobulin G with particular reference to the structures seen in crystalline preparations of Fc in the electron microscope.

Studies on the further purification of erythropoietin, which take advantage of the change in electrophoretic properties of erythropoietin after removal of sialic acid by mild acid hydrolysis have continued with the co-operation of Mr. W. Lukowsky. Although erythropoietin loses all biological activity as measured *in vivo*, the hormone can be detected in fractions during purification, using the *in vitro* assay developed earlier.

In Mr. Pinteric's laboratory, further investigations were carried out on the ultrastructure of immunoglobulins and their fragments as seen in the electron microscope. Supporting morphological evidence was provided on preparations of biological membranes and cell fragments such as Golgi apparatus, plasma membrane, mitochondrion, etc., for Drs. Fisher, Schachter, Murray, Kay, Williams, and Thompson. The factors which affect the structure of phospholipid liquid crystals in aqueous systems were studied with Dr. Tinker. The effect of chloramphenicol on production of ribosomes in *E. coli* was studied in co-operation with Dr. Wong. An optical diffractometer has been perfected for use as a measurement device for images of periodic structures seen in the electron microscope.

In Dr. Schachter's laboratory, several problems in the area of glycoprotein metabolism have been pursued. Mr. R.L. Hudgin is continuing work on three glycosyltransferases located in rat liver Golgi apparatus. Miss I. Jabbal has discovered two new GDP-fucose: glycoprotein fucosyl transferases in pork liver; the incorporation of L-fucose into plasma glycoproteins has not previously been reported. Mr. R. Yuen is continuing purification work on an enzyme he discovered last year, namely, L-fuconate dehydratase. Miss N. Nwokoro is studying an NAD-dependent dehydrogenase which acts upon 2-keto-3-desoxy-2-fuconate. These enzymes provide a catabolic pathway for L-fucose in pork liver. Miss P. Letts is attempting to demonstrate the enzyme which transfers N-acetylglucosamine from UDP-N-acetylglucosamine to polypeptide backbone.

Research in Dr. Scrimgeour's laboratory has been directed to an examination of the chemical and enzymatic properties of folic acid coenzymes and pteridines, and the study of the mechanisms of enzyme reactions involving several nucleotide transformations.

Mr. Mutsufumi Kawai has examined the reduction of folic acid and dihydrofolic acid by sodium dithionite. He has used a polarographic technique to detect a sulphinate adduct as intermediate in the reduction process, and from kinetic evidence has formulated a mechanism for this reduction reaction. Mr. Michael Archer has concluded an examination of the conversion of quinonoid dihydropterins to 7,8-dihydropterins. Miss Diana Chippel has succeeded in fully characterizing the products of the oxidative degradation of the coenzymes dihydrofolate and tetrahydrofolate. Mr. Alan Dennis and Mr. Tai-Wing Wu have been examining the enzymes GMP reductase and IMP dehydrogenase in *B. subtilis*. Both of these enzymes have been termed "allosteric" or control enzymes on the basis of their inhibition by ultimate metabolic products. Mr. Wu has indeed found that IMP dehydrogenase binds the inhibitor GMP to a site distinct from the catalytic site. Mr. Dennis has found indications that the GMP reductase is a soluble flavoprotein. Miss Surinder Cheema and Mr. Bruce Berman are studying the enzymes related to the hydroxylation of phenylalanine. Miss Cheema has purified to homogeneity the dihydropterin reductase of sheep liver. Mr. Berman has commenced a purification of the phenylalanine hydroxylase from *Comamonas fluorescens*, with the hope

of determining if there is a metal-ion requirement for this reaction. An understanding of these two enzyme reactions is essential for the study of the disease phenylketonuria.

Dr. Thompson, with the assistance of Miss Roberta Wong, Mr. Roy Baker, Mr. Kevin Keough, Mr. Joel Parkes, and Mr. Gordon MacDonald, is continuing studies in three areas of lipid metabolism: (a) metabolism of phosphoinositides in the central nervous system, with particular emphasis on the positional distribution and turnover of fatty acids in the phosphoinositides, and the purification and properties of enzymes hydrolysing inositol lipids; (b) the composition and synthesis of phospholipids in inner and outer mitochondrial membranes; (c) the primary events in liver metabolism associated with fatty infiltration of liver in the choline-deficient animal.

In the laboratory of Professor D.O. Tinker, studies of the chemistry of complex lipids and lipolytic enzymes are in progress. Mr. Michael Wills has completed research on the morphology and proton-binding properties of phosphatidyl inositol in aqueous system. Mr. Kenneth Siren has completed research on the phase relationships of the model ternary lipid system cetyl alcohol-water-methanol. In the course of the work, an improved optical system with thermostating capability for the Brice-Phoenix light-scattering photometer has been designed and built. Mr. David Purdon has carried out chemical characterization on the highly purified phospholipase A₂ from *Crotalus atrox* venom. Professor Tinker, in collaboration with Dr. Peter Rand (Brock University) and Mr. L. Pinteric, has completed an X-ray diffraction and electron microscopic investigation of the structures of liquid crystals formed by phosphatidyl ethanolamine in aqueous systems. A lamellar phase, two hexagonal phases, and at least one cubic phase have been observed.

In Professor Williams's laboratory, Dr. B.H. Robinson has been investigating the carrier system responsible for the movement of dicarboxylate and tricarboxylate anions across the mitochondrial membrane; Mr. Hugh Lawford has been studying the analogous system in Pseudomonads. Dr. G.S. Wong has been studying the functional relationship of these systems to integrated oxidations in mitochondria isolated from rat heart; Dr. M.F. Phillips has been examining this problem in plant mitochondria. Miss Jeanne Orr has been investigating the relationship of anion movement to induced cation permeability. Miss G.L. Perry has been analysing the kinetics of the succinate ferricyanide reductase systems. Miss K.A. Skov has been carrying out ORD studies of modified cytochromes c. Dr. I. Zamudio, Miss M.K. Hartman, and Professor Williams have extended their studies on the structure and function of cytochrome oxidase from mammalian and bacterial sources.

In Dr. Wong's laboratory the phenomenon of inhibitor-induced shift-downs in bacterial cells is being analyzed. Mr. R.N. Nazar has found that the inhibition of RNA synthesis during the shift is reversed by methionine additions. Mrs. B.G. Beatty has studied the synthesis of ribosomal proteins during the shift. Development of enzyme kinetic theory has continued in collaboration with Professor C.S. Hanes and Dr. L. Endrenyi, and application has been made in both dehydrogenase and permease systems by Mrs. A. Pincock and Miss P. Gurr.

SCHOLARLY ADDRESSES

T. AMBUS, E.E. DRYDEN and J.F. MANERY, "Uptake and Metabolism of L(+)- and D(-)-lactate by frog muscle," Proceedings of the Canadian Federation of Biological Societies, June 1970 (Montreal).

N.R. DAVIS and R.A. ANWAR, "On the mechanism of formation of desmosine and isodesmosine cross-links of elastin," Proceedings of the Canadian Federation of Biological Societies, June 1970 (Montreal).

C.I. HARRIS and T. HOFMANN, "Studies on equine trypsin and trypsinogen," Meeting of the Biochemical Society Oxford, July 11, 1969.

T. HOFMANN, "Evolution of Zymogens and mechanism of initiation of translation," Seminars - University of Alberta, Edmonton, March 2, 1970/Calgary, March 5, 1970; "Collagen and its function in the eye," Ophthalmology and Biochemistry Collo-

quium, Toronto, May 6, 1970; "Evolutionary aspects of zymogens and their activation," Meeting of the American Chemical Society and Canadian Institute of Chemistry, Toronto, May 28, 1970.

I. JABBAL and H. SCHACHTER, "Pork liver GDP-fucose-: glycoprotein fucosyl- transferases," Proceedings of the Canadian Federation of Biological Societies, 1970, 13 pp. (Montreal).

A. KUROSKY and T. HOFMANN, "The use of nitrous acid as a conformational probe for the N-terminal α -amino group in some serine proteases," Proceedings of the Canadian Federation of Biological Societies, June 1970 (Montreal).

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INSTITUTE OF BIO-MEDICAL ELECTRONICS

Under the direction of Professor N.F. Moody

During the seven years of its existence the Institute has developed into the leading centre for research and education in medical engineering in Canada and is rapidly establishing a world-wide reputation. No less than 77 scientific papers have been published by its staff and students, of which 45 have appeared in refereed journals; and two books, together with several chapters in others, have been authored by our staff. We take particular pride in the acceptance of our students by leading research centres throughout the world: thus, for example, one has joined the Karolinska Institute in Stockholm to continue his neurological studies, while another has completed two years postdoctoral fellowship at the Royal Postgraduate Medical School in London.

Of the twenty areas of research in progress, space allows mention of only two whose significance is readily appreciated. A biological adhesive has been developed as an alternative to suturing procedures in surgery, and it has been successfully tested on animals. Extensive investigations of possible tissue effects must, of course, be undertaken before clinical trials with patients are permissible and this study is in progress.

A new gamma-ray camera developed by the Institute allows isotope distribution to be photographed at cine-camera speed as they move through the living body. A model suitable for clinical trials is under construction.

Formal student training has always been given equal weight to the informal training received in their researches. Accordingly the course offering of the Institute has been considerably enriched during the current year. Although 12 graduate courses are now given under direct Institute auspices, undergraduate training has not been neglected, and this phase of our activity is expected to increase in the future. There is a fourth year biomedical engineering option for engineering students, six elective courses for third and fourth year medical students, and several electives in engineering for life science students.

With an academic staff of 9, a non-academic and professional staff of 10, and approximately 30 graduate students, the problems of space have become crucial.

At present some of our staff and research laboratories must be sited in other buildings, with a resultant loss of efficiency and the close contact which spurs intellectual innovations. We hope that some way will be found to alleviate these problems in the coming year.

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- "Role of Schottky Barrier Devices in Integrated Circuit Technology" (*ibid.*, pp. 86-7).
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- "A Study of the Impedance of the Canine Bladder, with Applications to Electrical Stimulation" (*ibid.*, paper 11 0-10).
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FAMILY AND COMMUNITY MEDICINE

Under the direction of Professor R.L. Perkin

The academic year 1969-70 was the first year of operation of the Department of Family and Community Medicine in the Faculty of Medicine at the University of Toronto. The activities leading up to the establishment of this new Department had begun in 1966 with the establishment of Family Practice Units at the Toronto General Hospital, the Toronto Western Hospital, the Wellesley Hospital, Women's College Hospital, and Sunnybrook Hospital. Between 1966 and 1969 these units were included in the activities of the Department of Medicine. The Dean's Committee to study the feasibility of a Family Practice Care Programme for the Faculty was struck in 1967 and met over a period of two years under the chairmanship of Dr. I.M. Hilliard. This committee developed the guidelines and made the recommendations which eventually led to the establishment of a Department of Family and Community Medicine by the Faculty Council in 1969.

The existing Family Practice Units continued to expand their operations during the 1969–70 year. A new Family Practice Unit was opened at St. Michael's Hospital in October 1969, and another new Unit is planned for the New Mount Sinai Hospital to open in July 1970.

Undergraduate teaching was concentrated in Period III of the new curriculum. All of the clinical clerks during one fifteen-week period in their clerkship spent one-half day per week in the Family Practice Unit at the teaching hospital to which they were attached. In this setting, they gained experience in the care of ambulatory patients and familiarized themselves with the type of problems commonly presented to the family physician. The Department of Family and Community Medicine also co-operated with the Department of Behavioural Science in providing the clinical component of the Behavioural Science Programme to Period I undergraduate medical students. As yet there is no teaching programme in Family and Community Medicine in Period II of the new curriculum.

Between 1967 and 1969, the Dean's Committee had drafted a two-year residency programme in family medicine for this Faculty. During the 1969–70 academic year, these plans were put into operation. Twenty-four first-year and six second-year residents were enrolled to begin this graduate programme in June 1970. The participating teaching hospitals are the Toronto General Hospital, the Toronto Western Hospital, St. Michael's Hospital, New Mount Sinai Hospital, and Sunnybrook Hospital. A residency programme of this size is an ambitious undertaking for a relatively small clinical department early in its development. The success of the residency programme is critical if we are to respond to the government's Directive to train more family physicians for our province. We have been greatly encouraged by the excellent co-operation received from the other clinical departments in the Faculty in the planning of our graduate programme.

RESEARCH

Toronto General Hospital

J.S.W. Aldis is conducting multiple research projects at OHSIP on utilization of medical services and epidemiology.

Peter Law is co-operating in a research project on pulmonary embolism with Dr. Mustard.

David Lawee has submitted for publication "Calcium and Phosphorous metabolism, an evaluation of one thousand patients."

F.B. Fallis presented "A survey of Metropolitan Toronto General Practitioners – where, who and how many" to the Clinical Research Society of Toronto in May 1970.

Toronto Western Hospital

R.L. Perkin and the staff of the Family Practice Unit are engaged in a research project, "The Role of the Community Health Nurse," with the University of Toronto School of Nursing, which is exploring the expanded role of the community health nurse attached to a group family practice. This research was begun in September 1969 and will be a continuing project.

Sunnybrook Hospital

D.H. Johnson and the staff of the Department of Family and Community Medicine at Sunnybrook Hospital began a project in January 1970 to determine how families in the Sunnybrook area cope with acute and chronic health situations as well as health maintenance. This project is in the form of a household survey of randomly selected homes in the Sunnybrook area. It is expected that this project will also elucidate some deficiencies in current health care and indicate the community's desires and demands for the future.

A second project, "Doctor-Nurse Shared Care for Chronically Ill Patients," has recently been approved to identify the characteristics of problems encountered by

patients with chronic disease who are being managed on an ambulatory basis. It is designed to develop more efficient use of the skills of doctors and nurses in managing these problems.

HONOURS

F.B. FALLIS: awarded Fellowship in College of Family Physicians of Canada, October 1969; chairman of the Committee on Community Health of the Council of Health of the Province of Ontario.

N.N. LEVINNE: awarded Fellowship in College of Family Physicians of Canada, October 1969.

R.L. PERKIN: awarded Fellowship in College of Family Physicians of Canada, March 1970; chairman of the National Committee on Undergraduate Medical Education, College of Family Physicians of Canada.

P. ROBERTS: president of the North Toronto Medical Society.

SCHOLARLY ADDRESSES

J.S.W. ALDIS, "OHSIP and the Health Care Team," presented to the Ontario Chapter, College of Family Physicians of Canada.

F.B. FALLIS, "Role of the Primary Physician," presented to the Canadian Medical Association, 1969; "Practice in the USSR and other countries abroad," presented to the North Toronto Medical Association, 1970; "What's New in Family Medicine," presented to the Ontario Hospital Association, 1970.

D. LAWEE, "Calcium and Phosphorous Metabolism – an evaluation of one thousand patients," at Toronto General Hospital, presented to the National Research Committee of the College of Family Physicians of Canada, August 1969.

M. TRENHOLME, Paper presented to the Symposium on Diet and Heart Disease at the Park Plaza Hotel, Toronto, March 1970.

PUBLICATIONS

FALLIS, F.B. "Family Physician in a Changing Society" (*The Canadian Family Physician*, 1970, pp. 37–45).

FISHBEIN, G. "Communications in Medical Practice" (*The Canadian Family Physician*, 1970, pp. 37–8).

LAWEE, D. "Automation – Multiphasic Screening and The General Practitioner" (*The Canadian Family Physician*, 1970, pp. 21–6).

PERKIN, R.L. "Surgery in Family Practice – a Viewpoint" (*The Canadian Family Physician*, 1970, pp. 17–19).

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DEPARTMENT OF MEDICAL BIOPHYSICS

Under the direction of Professor H.E. Johns

Professor Aspin, with Professors Sass-Kortsak and Levison of the Department of Paediatrics, is using radionuclides of copper to study copper absorption and the role of ceruloplasmin in Wilson's disease. They are also studying the distribution of technetium labelled aerosols in patients with cystic fibrosis who are breathing from mist tents. Much of this work is carried out at the Hospital for Sick Children.

Professor Bruce, with Dr. Lin, is continuing to study the effects of chemotherapeutic agents on spontaneous leukemia, transplanted, and spontaneous solid tumours

in mice with the hope of developing rationales for treatments that might be applicable in the treatment of human neoplasms. With Dr. Meistrich, he is also examining the process of differentiation in the testes of mice using cell separation and biochemical techniques. The use of computers in handling patient records is now complete and is being used by the other clinics of the Ontario Cancer Treatment and Research Foundation in the province of Ontario.

Professor Carver is concerned with the overall problem of determining the forces which stabilize the 3-dimensional structure of proteins. Using a large spin-echo spectrometer, he is currently examining the way in which ions affect protein stability.

Professor Cunningham heads a group using experimental and computer methods to determine radiation dose distributions within patients undergoing radiotherapy. A number of computer programmes have been developed and are in routine use for radium calculations and external beam therapy. The work involves both the use of time-sharing service on a large computer system and development of a small in-house computer.

Professor Howatson is continuing his studies on the fine structure of cells, viruses, and macromolecules, using electron microscopy. The genetics and physiology of replication of an RNA virus are being studied by means of temperature sensitive mutants.

Professor Hunt and Professor Johns are studying the early initial processes of radiation damage to DNA components. Using short, intense pulses of light, new reactions have been detected and studied in pyrimidines. Using high energy electrons from the linear accelerator in the Physics Department, a unique pulse radiolysis technique has enabled them to observe radiation species in lifetimes as short as 20 picoseconds (20×10^{-12} sec). The results of these investigations have forced revisions in current theories of chemical damage.

Professor McCulloch and Professor Till have continued their studies of the regulation of hemopoiesis. Using colony methods *in vivo* and in culture, combined with cell separation and genetic techniques, they have established three stages in hemopoietic differentiation, and are investigating specific mechanisms regulating transitions between them.

Professor Miller and Professor Phillips are studying the cellular events involved in the differentiation of the immune system. They are continuing to develop physical methods suitable for purifying and analysing the cells at different stages of development. Professor Phillips is actively involved in a programme directed toward transplantation of human bone marrow. Professor Miller is attempting to characterize human red cells by physical means with the objective of developing methods which may be used in routine hematology.

Professor Ottensmeyer is continuing the development of the technique of dark field electron microscopy and is using it to investigate the fine structure of macromolecules such as DNA, transfer RNA, and proteins.

Professor Rauth and Professor Whitmore are continuing their investigation of the effects of ionizing radiation, ultraviolet light, and various chemotherapeutic agents on mammalian cells in tissue culture. In addition, Professor Whitmore in collaboration with Professors Till and Siminovitch, has begun an investigation of the isolation and characterization of temperature sensitive mutants of mouse L cells *in vitro*.

Professor Sheinin is continuing her studies on the regulation of DNA synthesis in polyoma-infected cells and on the surface properties of normal and sv40-transformed 3T3 mouse cells. The latter studies have revealed differences in an external glycoprotein and in peptides of the isolated plasma membrane.

Professor Stanners is continuing his studies on the molecular biology of mammalian cells. He is concerned with the balance of macromolecular synthesis in cultured normal and malignant cells in different growth states and the effect of viruses on this balance.

Professor Taylor is continuing his investigation of the function of the heart and the cardiovascular system from X-ray angiographic pictures using a combination of television and computer techniques. The techniques retrieve numerical information

from the pictures and enhance the visual presentation of the picture information. His work is mainly centred at the Toronto General Hospital.

HONOURS

PROFESSORS E.A. McCULLOCH and J.E. TILL were jointly given a Gairdner Award for their work on the development of the spleen colony technique for the study of hemopoiesis.

PROFESSOR H.E. JOHNS was awarded an honorary degree of Doctor of Science on May 29, 1970, by McMaster University, for his distinguished contributions to Biophysics.

SCHOLARLY ADDRESSES

PROFESSOR N. ASPIN, with Drs. H. Levison E.A. Featherby, T.R. Weng, and B.J. Reilly, "Pulmonary Function in Cystic Fibrosis," 1st International Congress of Cystic Fibrosis, Brussels, Belgium, October 1969; Aspin *et al.*, "An evaluation of measurements of regional lung function in cystic fibrosis," Prairie Provinces Chapter, Society of Nuclear Medicine, Winnipeg, Manitoba, February 1970; Aspin *et al.*, "The distribution of fluid intake from mist tent therapy," the Society for Paediatric Research, Atlantic City, May 1970; with T.R. Weng and N. Levison, "Regional pulmonary function studies with Xenon 133 in children and young adults with bronchial asthma," the American Thoracic Society, Cleveland, Ohio, May 1970; with N. Marceau and A. Sass-Kortsak, "The *in vivo* transfer of ceruloplasmin copper to cytochrome oxidase," Canadian Federation of Biological Societies, Montreal, Quebec, June 1970; Aspin *et al.*, "The measurement of fluid uptake and distribution in the body following mist tent therapy," Canadian Thoracic Society, Winnipeg, Manitoba, June 1970.

PROFESSOR W.R. BRUCE, "Computers in Medical Records," Ontario Cancer Treatment and Research Foundation meeting, Geneva Park, Ontario, September 1969; "Computers in Medical Records," address to the Senior Medical Records Officers, Toronto, Ontario, October 10, 1969; "Studies on the Action of Cancer Chemotherapeutic Agents," Annual Symposium, Canadian Society for Clinical Investigation, Montreal, Quebec, October 16, 1969; "Studies on the Action of Chemotherapeutic Agents at the Cellular Level," Symposium on Biology of the Cancer Cell, Canadian Society for Clinical Investigation, Montreal, Quebec, January 21, 1970; "Radiobiological Considerations of Radiotherapy of Lymphoma," Symposium on Current Concepts in the Management of Lymphoma and Leukemia, University of Chicago, Chicago, USA, March 6, 1970; "Spermatogenesis," University of Western Ontario, London, March 17, 1970; with H. Lin, "Chemotherapy of a Transplanted Mouse Sarcoma," Annual Meeting of the American Association for Cancer Research, Philadelphia, Pa., April 11, 1970; "Studies of Chemotherapeutic Agents," Warner-Lambert Research Institute, Sheridan Park, Ontario, March 25, 1970; "Quantitative Selective Cytotoxicity for Tumor Cells," Xth International Cancer Congress, Houston, Texas, May 21, 1970; "Studies of Spermatogenesis in the Mouse," Merck Frosst Laboratories Research Symposium, Montreal, Quebec, June 4, 1970; "Velocity Sedimentation Separation of Mouse, Boar and Bull Spermatogonial Cells," Spermatogenesis Workshop, McGill University, Montreal, Quebec, June 7, 1970.

PROFESSOR J.R. CUNNINGHAM, "Summer school on dosimetry," American Association of Physicists in Medicine, Burlington, Vermont, August 1969; "Calculation of dose in a single beam using scatter air ratios," Second International Conference on Medical Physics, Boston, Mass., August 1969; "The computer-applications in radiotherapy," Second Clinical Research Conference, Ontario Cancer Foundation, Geneva Park, Ontario, September 1969; "Use of a display oriented small computer in radiotherapy," XIIth International Congress of Radiology, Tokyo, Japan, October 1969; "Computer applications in therapeutic radiology - cooperative uses," Annual Meeting, American Association of Physicists in Medicine, Chicago, December 1969; "Dosage

Calculations in radiotherapy," University of Wisconsin Medical School, Madison, Wisconsin, March 1970; "Radiation treatment planning at the Ontario Cancer Institute," University of Minnesota Hospital, Minneapolis, March 1970.

PROFESSOR A.F. HOWATSON, "Oncogenic Viruses: A survey of their properties," 1st International Conference on Comparative Virology, Université de Montréal, Québec, September 1969; "Oncogenic Viruses," University of Guelph, Department of Veterinary Microbiology and Immunology, Guelph, Ontario, October 1969; "Survey of the properties of oncogenic viruses," Veterans Administration Hospital, New York, December 1969.

PROFESSOR J.W. HUNT, "The scavenging of dry electrons as measured by a picosecond pulse radiolysis technique," University of Notre Dame, Radiation Laboratory, Notre Dame, Indiana, December 1969; "The reactions of dry electrons with concentrated scavengers," International Meeting on Primary Radiation Effects in Chemistry and Biology, Buenos Aires, Argentina, March 1970.

PROFESSOR H.E. JOHNS, "Mechanisms of uv damage in pyrimidines," 2nd International Conference on Medical Physics, Boston, August 1969; "Mechanisms in DNA photochemistry," Symposium on Biological Molecules in their excited states, New York, October 1969; "Mechanisms of uv damage in pyrimidines," Southwest Center for Advanced Studies, Dallas, Texas, December 1969; with M.A. Herbert "Flash photolysis studies of orotic acid," 14th Annual meeting of the Biophysical Society, Baltimore, February 1970; with D.W. Whillans, "Studies on the excited states of uracil derivatives by flash photolysis techniques," 14th Annual Meeting of the Biophysical Society, Baltimore, February 1970; with G. DeBoer and O. Klinghoffer, "Base catalyzed reversal of the photohydrates of cytosine and its derivatives," 14th Annual Meeting of the Biophysical Society, Baltimore, Maryland, February 1970; "Mechanism of uv damage in pyrimidines," International Meeting on Primary Radiation Effects in Chemistry and Biology, Argentina, March 1970.

PROFESSOR E.A. McCULLOCH, "Myelopoiesis and Lymphopoiesis compared at the cellular level," Canadian Federation of Biological Societies, Edmonton, Alberta, June 1969; "A new approach to bone marrow transplantation in man," Second Clinical Cancer Research Conference, Lake Couchiching, Ontario, September 1969; "Cellular interaction in the regulation of hemopoietic progenitor cells," Centennial Symposium, St. Elizabeth's Hospital, Brighton, Mass., November 1969; "*In vitro* techniques in mice and man," Bone Marrow Culture Conference, National Institutes of Health, Bethesda, January 1970; "Cellular events in hemopoiesis," Trent University, Peterborough, Ontario, April 1970; "Regulation of early events in hemopoietic cell differentiation," Allegheny General Hospital, Pittsburgh, May 1970; "Hemopoietic cellular differentiation: A problem at the interface between biology and medicine," University of Tennessee, Memphis, May 1970.

PROFESSOR R.G. MILLER, "A physicist's view of hematology," Ontario Antibody Club, November 1969; "Separation of cells required to initiate the immune response from other cells in mouse spleen," Bone Marrow Transplantation Meeting, Baltimore, Maryland, December 1969; "Tissue fingerprinting: A method for physical characterization of heterogenous cell populations," Tenth International Cancer Congress, Houston, Texas, May 1970; "Initiation of the immune response," Microbiology Society, Toronto, June 1970.

PROFESSOR R.A. PHILLIPS, "Physical separation of hemopoietic stem cells from cells involved in graft-versus-host disease," Bone Marrow Transplantation Meeting, Baltimore, Maryland, December 1969; "Bone marrow transplantation: Physical separation of stem cells from cells responsible for graft-versus-host disease," Tenth International Cancer Congress, Houston, Texas, May 1970; with R.M. Garczynski, "Physical separation of two cells required to initiate an immune response to sheep erythrocytes in the mouse," Canadian Federation of Biological Societies, Montreal, June 1970; with H.R. MacDonald "Synchronization of mouse L cells by a velocity sedimentation technique," Canadian Federation of Biological Societies, Montreal, June 1970; with D. Amato, and D.H. Cowan, "Separation of human bone marrow by

velocity sedimentation," Canadian Federation of Biological Societies, Montreal, June 1970.

PROFESSOR F.P. OTTENSMEYER, "The fine structure of unstained and unshadowed macromolecules by dark field electron microscopy," 158th American Chemical Society Meeting, New York, September 1969; Queen's University, Kingston, Ontario, October 1969; Atomic Energy of Canada Ltd., Pinawa, Manitoba, October 1969; New York University Medical Center, October 1969; University of Pennsylvania Medical School, January 1970; Harvard University, Mass., February 1970; Yale University, March 1970; Columbia University, April 1970; Xth International Cancer Congress, Houston, Texas, May 1970.

PROFESSOR A.M. RAUTH, "Aspects of the repair of uv damage in mammalian cells," University of Rochester, N.Y., August 1969; with M. Domon, "Alterations of uv damage in mouse L cells," Radiation Research Society, Dallas, Texas, February 1970; with S. Chiu, "Effect of ultraviolet light on the colony forming ability of mouse bone marrow cells assayed *in vitro*," Canadian Federation of Biological Societies, Montreal, June 1970; with S. Shuve, "Effects of phleomycin on mouse L cells," Canadian Federation of Biological Societies, Montreal, June 1970.

PROFESSOR R. SHEININ, with P.E. Branton, "DNA synthesis in polyoma-infected cells," Cold Spring Harbor Symposium on Quantitative Biology, Tumor Virus Meeting, Cold Spring Harbor, August 1969; with K. Onodera, "Viral oncogenesis and a surface component of mouse cells," Cold Spring Harbor Symposium on Quantitative Biology, Tumor Virus Meeting, August 1969; "Regulation of DNA synthesis in polyoma-infected cells," Banting and Best Institute, Toronto, February 1970.

PROFESSOR K.W. TAYLOR, "Electrical hazards for the anaesthetist," Ontario Medical Association, Fall Meeting, Kitchener, 1969.

PROFESSOR, J.E. TILL, "Hemopoietic stem cells," Gairdner Foundation meeting, Toronto, October 1969; "Cellular differentiation and its radiosensitivity in the hemopoietic system," Defence Research Board, Canadian Forces Institute of Environmental Medicine, Toronto, May 1970; "Cellular differentiation in the blood-forming system of the mouse," the Pennsylvania State University, Pennsylvania, May 1970.

PROFESSOR G.F. WHITMORE, "The role of the physicist in biological research," Canadian Association of Physicists, Waterloo, Ontario, June 1969; "Biological sensitivity," Clinical Cancer Research Conference, Geneva Park, Ontario, September 1969; with S. Gulyas and J. Kotalik, "Recovery from radiation damage in mammalian cells," National Academy of Sciences, National Research Council, Symposium on Time Dose Relationships in Radiotherapy, California, September 1969; "Modification of recovery processes in mammalian cells," XII International Congress of Radiology, Tokyo, Japan, October 1969; "Temperature sensitive mutants of mouse L cells," State University of New York, Buffalo, April 1970.

PUBLICATIONS

- AMATO, D., ISCOVE, N.N., COWAN, D.H. and McCULLOCH, E.A. "Separation of Human Bone Marrow by Velocity Sedimentation" (*Experimental Hematology*, no. 20, 1970, p. 8).
- BACCHETTI, S. and WHITMORE, G.F. "Actinomycin D: Effects on Mouse L-Cells" (*Biophysical Journal*, vol. 9, 1969, pp. 1427-45).
- "The Action of Hydroxyurea on Mouse L-Cells" (*Cell and Tissue Kinetics*, vol. 2, 1969, pp. 193-211).
- BLACKSTEIN, M.E., STANNERS, C.P. and FARMILLO, A.J. "Heterogeneity of Polyoma Virus DNA: Isolation and Characterization of Non-infectious Small Supercoiled Molecules" (*Journal of Molecular Biology*, vol. 42, 1969, pp. 301-13).
- BORSA, J. and WHITMORE, G.F. "Cell Killing Studies on the Mode of Action of Methotrexate on L-Cells *in vitro*" (*Cancer Research*, vol. 29, 1969, pp. 737-44).
- "Studies relating to the Mode of Action of Methotrexate. II, Studies on Sites of Action in L-Cells *in vitro*; III, Inhibition of Thymidylate Synthetase in Tissue Culture Cells and in Cell-free Systems" (*Molecular Pharmacology*, vol. 5, 1969, pp. 303-17; 318-22).
- BORSA, J., WHITMORE, G.F., VALERIOTE, F.A., COLLINS, D. and BRUCE, W.R. "Studies on the Persistence of Methotrexate, Cytosine Arabinoside and Leucovorin in Serum of Mice" (*Journal of the National Cancer Institute*, vol. 42, 1969, pp. 235-42).

- BRONSKILL, M.J., TAYLOR, W.B., WOLFF, R.K. and HUNT, J.W. "Design and Performance of a Pulse Radiolysis System Capable of Picosecond Time Resolution" (*Review of Scientific Instruments*, vol. 41, 1970, pp. 333-40).
- BROWN, F.R., CARVER, J.P. and BLOUT, E.R. "The Low Temperature Circular Dichroism of (Gly-Pro-Ala)_n" (*Journal of Molecular Biology*, vol. 39, 1969, pp. 307-13).
- BRUCE, W.R., MEEKER, B.E., POWERS, W.E. and VALERIOTE, F.A. "Comparison of Time-Survival Curves for Normal Hematopoietic and Lymphoma Colony-forming Cells exposed to Vinblastine, Vincristine, Arabinosyl Crystosine and Amethopterin" (*Journal of the National Cancer Institute*, vol. 42, 1969, pp. 1015-23).
- BRUCE, W.R., JENKIN, R.D.T. and GORDON, S. "A Physician-oriented Medical Index for Hospital or Clinic Use" (*Canadian Medical Association Journal*, vol. 103, 1970, pp. 1080-4).
- BRUCE, W.R. and LIN, H. "An Empirical Cellular Approach to the Improvement of Cancer Chemotherapy" (*Cancer Research*, vol. 29, 1969, pp. 2308-10).
- CHEEVERS, W.P., BRANTON, P.E. and SHEININ, R. "Characterization of Abnormal DNA formed in Polyoma Virus-infected Cells" (*Virology*, vol. 40, 1970, pp. 768-72).
- CHEEVERS, W.P. and SHEININ, R. "Selective Measurement of the Synthesis and Metabolic Stability of Messenger RNA in 3T3 Mouse Cells" (*Biochimica et Biophysica Acta*, vol. 204, 1970, pp. 449-61).
- CUNNINGHAM, J.R. and JOHNS, H.E. "The Calculation of Absorbed Dose from Exposure Measurements: Practical Problems in Dosimetry" (*Physics in Medicine and Biology*, vol. 15, 1970, pp. 71-8).
- DOMON, M., BARTON, B., PORTE, A. and RAUTH, A.M. "The Interaction of Caffeine with Ultraviolet Light Irradiated DNA" (*International Journal of Radiation Biology*, vol. 17, 1970, pp. 395-9).
- DOMON, M. and RAUTH, A.M. "Effects of Caffeine on Ultraviolet-irradiated Mouse L Cells" (*Radiation Research*, vol. 39, 1969, pp. 201-21).
- "Ultraviolet-light Irradiation of Mouse L Cells: Effects on Cells in the DNA Synthetic Phase" (*ibid.*, vol. 40, 1969, pp. 414-29).
- GREENSTOCK, C.L., HUNT, J.W. and NG, M. "Pulse Radiolysis Studies of Uracil and its Derivatives .OH and .H Radical Attack" (*Transactions of the Faraday Society*, vol. 65, no. 564, 1969, pp. 3279-87).
- HOWATSON, A.F. "Electron Microscopic Procedures in Virology"; in *Fundamental Techniques in Virology*, ed. Karl Habel and Norman P. Salzman, pp. 505-23. New York: Academic Press, 1969.
- HOWATSON, A.F. and WILDY, P. "The Virion: Structure and Function"; in *International Virology I*, ed. Joseph L. Melnick, pp. 1-19. Basel: S. Karger, 1969.
- ISCOVE, N.N., TILL, J.E. and McCULLOCH, E.A. "The Proliferative States of Mouse Granulopoietic Progenitor Cells" (*Proceedings of the Society for Experimental Biology and Medicine*, vol. 134, 1970, pp. 33-6).
- JOHNS, H.E. "Photochemical Reactions in Nucleic Acids"; in *Enzymology*, vol. 16, by Kenneth Kustin, pp. 253-316. New York: Academic Press, 1969.
- "Use of X and γ Rays in Radiotherapy"; in *Radiation Dosimetry III*, by F.H. Attix, pp. 677-741. New York: Academic Press, 1969.
- "X Rays and Teleisotope γ Rays"; in *ibid.*, chapter 17.
- LAM, D., FURRER, R. and BRUCE, W.R. "The Separation, Physical Characterization and Differentiation Kinetics of Spermatogonial Cells of the Mouse" (*Proceedings of the National Academy of Sciences*, vol. 65, 1970, pp. 192-9).
- MARCEAU, N., ASPIN, N. and SASS-KORTSAK, A. "Absorption of Copper 64 from Gastrointestinal Tract of the Rat" (*American Journal of Physiology*, vol. 218, 1970, pp. 377-83).
- McCOOL, D., MILLER, R.J., PAINTER, R.H. and BRUCE, W.R. "Erythropoietin Sensitivity of Rat Bone Marrow Cells Separated by Velocity Sedimentation" (*Cell and Tissue Kinetics*, vol. 3, 1970, pp. 55-65).
- McCOOL, D., BRUCE, W.R. and PAINTER, R.H. "The Large Scale Preparation of Erythropoietin Suitable for Use in Tissue Culture" (*Experimental Hematology*, no. 20, 1970, pp. 130-8).
- McCULLOCH, E.A. "New Roads to Clinical Research at the University of Toronto" (*Science Forum*, vol. 7, 1969, pp. 28-9).
- McCULLOCH, E.A., THOMPSON, M.W., SIMINOVITCH, L. and TILL, J.E. "Effects of Bacterial Endotoxin on Hemopoietic Colony-forming Cells in the Spleens of Normal Mice and Mice of Genotype Sl/sl^d" (*Cell and Tissue Kinetics*, vol. 3, 1970, pp. 47-54).
- MEKORI, T. and PHILLIPS, R.A. "The Immune Response in Mice of Genotypes W/W^{*} and Sl/Sl^d" (*Proceedings of the Society for Experimental Biology and Medicine*, vol. 132, 1969, pp. 115-19).
- MILLER, R.G. and PHILLIPS, R.A. "Separation of Cells by Velocity Sedimentation" (*Journal of Cellular Physiology*, vol. 73, 1969, pp. 191-202).
- "Separation of Cells required to Initiate the Immune Response from Other Cells in Mouse Spleen" (*Experimental Hematology*, vol. 20, 1970, p. 6).
- OTTENSMAYER, O. "Macromolecular Finestructure by Dark Field Electron Microscopy" (*Biophysical Journal*, vol. 9, 1969, p. 1144).

- PHILLIPS, R.A. and MILLER, R.G. "Antibody Producing Cells: Analysis and Purification by Velocity Sedimentation" (*Cell and Tissue Kinetics*, vol. 3, 1970, pp. 263-74).
- "Physical Separation of Hemopoietic Stem Cells from Cells involved in Graft-versus-Host Disease" (*Experimental Hematology*, vol. 20, 1970, p. 7).
- PUJARA, C.M. and WHITMORE, G.F. "An Experimental Investigation of the Division Probability Model for Cell Growth" (*Cell and Tissue Kinetics*, vol. 3, 1970, p. 99-118).
- RAUTH, A.M. "Effects of UV Light on Mammalian Cells in Culture" (*Current Topics in Radiation Research*, vol. 6, 1970, pp. 195-248).
- REED, R.D., HUGHES, T.J., TAYLOR, W.B. and BRUCE, W.R. "The Electronic Determination of the Size Distribution of L-cell Minicolonies" (*Experimental Cell Research*, vol. 56, 1969, pp. 435-42).
- SENN, J.S. and McCULLOCH, E.A. "Kinetics of Regeneration after Cyclophosphamide in Human Marrow assessed by a Cell Culture Method" (*Experimental Hematology*, vol. 20, 1970, p. 8).
- "Radiation Sensitivity of Human Bone Marrow Cells measured by a Cell Culture Method" (*Blood*, vol. 35, 1970, pp. 56-60).
- STEIMANN, K. and ASPIN, N. "A Device for Dispensing Radioactive Xenon Gas" (*Radiology*, vol. 92, 1969, pp. 396-7).
- TILL, J.E. "How does the body protect itself against a variety of diseases?" (*Science Forum*, vol. 2, 1969, pp. 35-7).
- WHILLANS, D.E., HERBERT, M.A., HUNT, J.W. and JOHNS, H.E. "Optical Detection of the Triplet State of Uracil" (*Biochemical and Biophysical Research Communications*, vol. 36, 1969, pp. 912-18).
- WHITMORE, G.F., BORSA, J., BACCHETTI, S. and GRAHAM, F. "Discussion: Mammalian Cell Killing by Inhibitors of DNA Synthesis" (*Recent Results in Cancer Research. Normal and Malignant Cell Growth*, vol. 17, 1969, pp. 109-17).
- WORTON, R.G., McCULLOCH, E.A. and TILL, J.E. "Physical Separation of Hemopoietic Stem Cells Differing in their Capacity for Self-renewal" (*Journal of Experimental Medicine*, vol. 130, 1969, pp. 91-103).
- "Physical Separation of Hemopoietic Stem Cells forming Colonies in Culture" (*Journal of Cell Physiology*, vol. 74, 1969, pp. 171-82).

MEDICAL CELL BIOLOGY

Under the direction of Professor L. Siminovitch

The Department of Medical Cell Biology moved into its new quarters in the Medical Sciences Building in the Fall of 1969.

The research activities of the members of the department have become established during this year and a number of graduate and postgraduate students are involved in this programme. For the first time the Medical Cell Biology group participated in the undergraduate teaching programme in period 1B of the medical curriculum.

RESEARCH

Professor B. Cinader has been studying enzyme (ribonuclease)-activation by specific antibody and has shown that the combination by s-peptide with s-protein is promoted by this antibody. Studies of the genetic control of antibody response have been continued. Genetic factors which control tolerance-induction and tolerance-breakdown are being analysed. The nature of cell receptors on thymus and bone marrow cells is being investigated. The complement deficiency of certain inbred mouse-strains have been employed to investigate immunosuppression by antibody against allotypes (with Dr. S. Dubiski) and by antilymphocyte serum.

Professor C.R. Fuerst is continuing his studies of the bacterial virus lambda. He is investigating the mechanism of action of viral genes through the use of mutants of lambda.

Professor M. Gold is studying the replication and modification of nucleic acids and, in particular, the mechanisms of synthesis of bacteriophage nucleic acids and the

steps whereby these molecules mature and become biologically active. Studies are also being initiated on the molecular biology of "Resistance Factors" – in episomal genetic elements which confer resistance to a wide range of antibiotics in bacteria.

Professor L.A. MacHattie has begun preliminary stages of a study of base-sequence configuration in the chromosome of bacteriophage P₁ and its possible variability in different host cells.

Professor M.L. Pearson is studying the molecular basis of genetic controls regulating RNA and protein synthesis in bacteriophage lambda.

Professor B.D. Sanwal's research was in the general area of control mechanisms involving energy generation and utilization in *Escherichia coli*, including the mechanisms of catabolite repression. The cyclic AMP binding protein involved in the regulation of sugar catabolism has been partially purified, and methods have been devised to obtain RNA polymerase complexed with cyclic AMP binding protein. The interaction of adenyl cyclase, which produces cyclic AMP in bacteria, with phospholipids was studied. Mutants were obtained which show defective transport of dissaccharides with a view to the elucidation of the role of cyclic AMP and phospholipids in this process.

Professor L. Siminovitch is studying the morphogenesis of bacteriophage λ. Mutants defective in one region of the chromosome are being used in an attempt to delineate the proteins involved in the mature particle, and in its formation. Studies have begun on the isolation and characterization of mutants in somatic cells, with particular attention being paid to conditional lethal mutations.

HONOURS

PROFESSOR B. CINADER, president, International Union of Immunological Societies; elected member of Gesellschaft für Immunologie; visiting professor, University of Saskatchewan.

PROFESSOR LOUIS SIMINOVITCH was elected to the Research Advisory Group of the National Cancer Institute of Canada.

SCHOLARLY ADDRESSES

PROFESSOR B. CINADER, "Immunologic Tolerance to Autochthonous Tumours," at the International Symposium on Cancer Immunology, Canadian Society for Immunology, Montreal; "Genetic Markers as a Probe to the Cellular Events of the Immune Response," "Transplantation Problems," and "Concepts of Teaching Immunology on the Undergraduate and Graduate Level," at the University of Saskatchewan.

PROFESSOR M. GOLD, Chairman of Scientific Session, "Protein Synthesis," at the 13th Annual Meeting of the Canadian Federation of Biological Societies, Montreal.

PROFESSOR L.A. MACHATTIE, "Physical Studies of DNA Phage Chromosomes," at the annual meeting of the Genetics Society of Canada, Vancouver.

PROFESSOR B.D. SANWAL, "General Concepts of Control," "Control of Amphibolic Pathways Catabolite Repression," and "Allosteric Enzymes," at the Department of Microbiology, MacDonald College, Montreal; "Teleonomic Aspects of Control of Amphibolic Pathways," at the Department of Biology, University of Calgary; "Allosteric Mechanisms," at the Department of Biology, University of Ottawa; "Control of Amphibolic Pathways," at the Department of Biochemistry, University of Alberta; "Mechanisms of Regulatory Interactions," at the American Chemical Society, Toronto.

PROFESSOR L. SIMINOVITCH, "Studies on the Development of λ Bacteriophage," and "A Survey of Research Being Conducted at the Ontario Cancer Institute," at the Imperial Cancer Research Fund, Lincoln's Inn Fields, London, England; "Cancer Research in Canada," at the workshop of the International Agency for Research on Cancer, Nice, France; "Studies on the Development of λ Bacteriophage," at the Institut Pasteur, Paris; Chaired Section II, "Biology of the Cancer Cell" (sponsored jointly by

the Canadian Society for Clinical Investigation and the Royal College of Physicians and Surgeons of Canada) at the Canadian Society for Clinical Investigation, Montreal; "The Isolation and Preliminary Characterization of Conditional Lethal Mutation in Somatic Cells," at Harvard Medical School, Boston; Chaired Section A – Molecular and Microbial Genetics of annual meeting, "Genetics Expanding Frontiers," at the Canadian Genetics Society, Vancouver; "Temperature-Sensitive Mutants of Somatic Cells," at Merck Frosst Laboratories Research Symposium, Montreal.

PUBLICATIONS

- BUCHWALD, M. and SIMINOVITCH, L. "Production of Serum-blocking Material by Mutants of the Left Arm of the λ Chromosome" (*Virology*, vol. 38, 1969, pp. 1–7).
- CHOU, C.-T., CINADER, B. and DUBISKI, S. "Allotypic Specificity in Productive, Pre-productive and Progenitor Cells"; in *Gamma Globulin – its Structure and Biosynthesis (Proceedings of the 5th Meeting of the Federation of European Biochemical Societies, Prague, Czechoslovakia, vol. 15, 1969, pp. 133–168).*
- "Allotypy as a Probe" (*Proceedings of 7th Annual Colloquium on Protides of the Biological Fluids, Brugge-Belgium, 1969, pp. 189–203).*
- CINADER, B. "Genetic Markers in Component-analysis of the Immune Apparatus"; in *Medicine in the University and Community of the Future, Proceedings of the Scientific Sessions Marking the Centennial of the Faculty of Medicine, Dalhousie University, 1969, pp. 189–93.*
- "Genetics of the Antibody Response" (*Proceedings of 7th Annual Colloquium on Protides of the Biological Fluids – Introduction, Brugge, Belgium, 1969, pp. 27–8).*
- "Science and Society" (*Canadian Federation News, vol. 12, 1970, pp. 54–8).*
- PELICHOVÁ, H., SUZUKI, T. and CINADER, B. "Enzyme-activation by Antibody II. The Distribution of Activating Antibody in Chromatographic Fractions of Ribonuclease Antisera and their Competition with Inhibiting Antibody for Enzyme Sites" (*Journal of Immunology, vol. 104, 1970, 195–202).*
- SANWAL, B.D. "Allosteric Controls of Amphibolic Pathways in Bacteria" (*Bacteriological Reviews, vol. 34, 1970, pp. 20–39).*
- "Regulatory Characteristics of the Diphosphopyridine Nucleotide Specific Malic Enzyme of *E. coli*" (*Journal of Biological Chemistry, vol. 245, 1970, pp. 1212–16).*
- "Regulatory Mechanisms involving Nicotinamide Adenine Nucleotides as Allosteric Effectors. III, Control of Glucose-6-Phosphate Dehydrogenase" (*ibid.*, pp. 1626–72).
- SANWAL, B.D. and SMANDO, R. "Regulatory Roles of Cyclic 3'–5' AMP in Bacteria: Control of Malic Enzyme of *Escherichia coli*" (*Biochemical and Biophysical Research Communications, vol. 35, 1969, pp. 486–91).*
- SHAPIRO, J., MACHATTIE, L., ERON, L., IHLER, G., IPPEN, K. and BECKWITH, J. "Isolation of Pure Lac Operon DNA" (*Nature, vol. 224, 1969, pp. 768–74).*
- SUZUKI, T., PELICHOVÁ, H. and CINADER, B. "Enzyme-activation by Antibody. I, Fractionation of Immune Sera in Search for an Enzyme-activating Antibody" (*Journal of Immunology, vol. 103, 1969, pp. 1366–76).*
- THOMPSON, L.H., MANKOVITZ, R., BAKER, R.M., TILL, J.E., SIMINOVITCH, L. and WHITMORE, G.F. "Isolation of Temperature-sensitive Mutants of L-Cells" (*Proceedings of National Academy of Science, vol. 66, 1970, pp. 377–84).*

INSTITUTE OF MEDICAL SCIENCE

Under the direction of Professor J.C. Laidlaw

This was the third year of the institute's existence and the second year since its degree programmes were approved by the Appraisals Committee of the Ontario Council on Graduate Studies.

During the year three members of staff resigned: H.B. Fairley to become Professor of Anaesthesia, University of California (San Francisco), W.S. Hartroft to go to the University of Hawaii as Professor of Experimental Pathology, and Dr. G.J. Hetenyi to take up the Chairmanship of the Department of Physiology, University of Ottawa. We wish these men well. During the 1969–70 session the following became members of staff of the Institute: A. Angel (Medicine), W.R. Bruce (Medical Biophysics),

A.C. Bryan (Anaesthesia), N.E. Diamant (Medicine), M.M. Fisher (Medicine), M.L. Halperin (Medicine), C.H. Hollenberg (Medicine), K.N. Jeejeebhoy (Medicine), W.H. LeRiche (Hygiene), R.G. Miller (Medical Biophysics), R.A. Phillips (Medical Biophysics), D.B.W. Reid (Hygiene), and P. Seeman (Pharmacology). With these changes, the staff now numbers 66, of whom 42 are from clinical departments, 21 from basic science departments, and 3 from the School of Hygiene.

E.A. McCulloch continued most capably as our Graduate Secretary. The Executive Committee consisted of R. Volpe, G. Steiner, D. Fraser, A. Sass-Kortsak, H. Stancer, I. Broder, the Graduate Secretary, the Director, and two graduate students, R. Hudson and N. Iscove. The Student Committee consisted of A. Becker, B.S.L. Kidd, A. Sass-Kortsak, G.G. Forstner, the Graduate Secretary, and the Director. I wish to express my gratitude to all of these men for their great help during the past year.

During the session 1969–70 there were 15 students in the Institute. Four of these (O. El-Arini, N. Iscove, H. Messner, and C. Park) were at the Princess Margaret Hospital, one (K. Shumak) at the Toronto General Hospital, five (L. Berka, W. Gregorowicz, M. Kelly, A. Lamarre, and A. Wilensky) at the Hospital for Sick Children, and five (R. Hudson, H. Kim, B. Lukie, I. Salti, and A. Yates) in the Clinical Science Division, Medical Sciences Building. Ten students were registered for the Ph.D. degree and five for the M.Sc. degree. The student seminars were capably arranged by G. Steiner; a seminar was given by each student during the year. For the session 1970–71 there will be 26 students in the Institute.

In the session 1969–70 the Institute offered two new courses “The Steroid Hormones” (D.W. Killinger and J.L. Ruse) and “Human Biology” (E.A. McCulloch and J.C. Laidlaw). The latter course was concerned with the types of approach to the study of normal and abnormal function of man.

During 1969–70 the Institute sponsored three visiting lecturers, Drs. J.W. Adamson, E. Diener, and A. Feinstein. Dr. Adamson from the Veterans’ Administration Hospital, Seattle, spoke on “The Regulation of Erythropoiesis in Polycythaemia Vera.” Dr. Diener, from the Walter and Eliza Hall Institute of Medical Research, Melbourne, lectured on “Mechanisms of Immunologic Tolerance at the Cellular Level.” Dr. Feinstein, from the Department of Medicine, Yale University, spoke on “Clinical Judgment and Basic Science.”

Since all members of the Institute have appointments in parent departments in the Faculty of Medicine or the School of Hygiene, the summary of their research publications, honours, and scholarly addresses will be found in the reports of the chairmen of these departments.

MEDICINE

Under the direction of Professor C.H. Hollenberg

GENERAL COMMENTS

On February 28, 1970, Dr. K.J.R. Wightman completed his term as Sir John and Lady Eaton Professor of Medicine in the University of Toronto, a post which he filled with great distinction for almost 10 years. During Dr. Wightman’s tenure the Department grew at a rate never before experienced and the influence and prestige of this department in Canadian medicine reached new heights. Dr. Wightman’s magnificent contribution to medicine in our country is recognized across the land and we can confidently anticipate that in his new position as Director of the Division of Postgraduate Medical Education in the University of Toronto, he will continue to contribute in a most significant fashion to the reputation of our Faculty and to medical education.

Every period of rapid expansion must inevitably be followed by consolidation and it is obvious that at least in the immediate future we shall have to spend considerable effort in consolidating and reorganizing our department. New additions to our staff will have to be made in a most selective fashion and we shall have to make sure that our internal organization is such that we are using our available resources wisely and effectively.

To this end, it is obvious that new ventures in interhospital co-ordination will have to be undertaken and it is clear that these ventures will involve not only our teaching functions but also our responsibilities in patient care. The groundwork for this type of development was set by Dr. Wightman when he appointed a series of specialty co-ordinators. This programme is being perpetuated and further developed.

During times of rapid change and financial stringency, the effort involved in getting the day to day work done may be so great that we can easily forget that our contributions are recognized by their quality as well as by the numbers of patients we treat, and students we teach. Irrespective of the pressures brought to bear upon us in both education and patient care, we must insist that we be allowed to work towards a level of excellence unequalled in the country. It is only in this way that we can in honesty meet our local and national responsibilities.

PERSONNEL

We are sorry to lose the following staff members through resignations. Dr. C. Hetenyi will be missed at Women's College Hospital when she moves with her husband to Ottawa. Dr. J.E.R. Johnson wishes to devote more time to his practice and Dr. P.A. King, also associated with Sunnybrook, is moving to British Columbia to set up a practice. Dr. V.R. Neufeld is leaving Toronto Western Hospital to take up a post at McMaster University. We are grateful for their help in the past and our sincere good wishes go with them.

It is with regret that we note the deaths of Dr. E.F. Brooks, long associated with St. Michael's Hospital, and of Dr. S. Rogers of Toronto General Hospital.

RESEARCH

Allergy - Immunology

Dr. I. Broder (TWH) : mechanism of immunologic histamine release; the role of soluble antigen-antibody complexes in the mechanism of rheumatoid arthritis, systemic lupus erythematosus and Aleutian Mink Disease. Dr. S. Dubiski (TWH) : studies in structure and formation of antibodies. Dr. D.A. Gordon (WH) : clinical and immunological studies of rheumatoid arthritis and related diseases (with Drs. I. Broder, W. Pruzanski, and M. Urowitz). Dr. A. Knight (SBH) : study of the serum of chronically ill patients for paraproteins; study of Disodium Cromoglycate in chronic asthmatic patients (with Dr. G. Davies). Dr. D. Osoba (PMH) : investigations into the cellular interactions required for the production of normal immune responses. Dr. W. Pruzanski (WH) : study of lysozymes and abnormal serum proteins in various disorders; study of bacteriolytic and bacteriocidal activity in synovial fluid and serum in various disorders.

Cardiovascular

Dr. A.G. Adelman (TGH) : computer technique for calculating left ventricular volume and evaluating myocardial contractility from left ventricular cineangiograms. Dr. H.E. Aldridge (TGH) : patients with atrial septal defects (secundum type) closed by surgery; postoperative studies of ventricular aneurysms; review of results of saphenous vein bypass grafts from aorta to coronary artery. Dr. D. Beanlands (TWH) : clinical study in the use of Lidocaine; with Dr. Zsoter, clinical study in the use of Propranolol; studies of Digitalis toxicity, alterations of the blood in angina pectoris. Dr. L. Casella (SMH) : correlation of findings of coronary angiography and life expectancy; laboratory studies on the response to exercise of the transplanted heart. Drs. K.W.G. Brown

and R.L. MacMillan (ТГН): study of primary ventricular fibrillation; comparison of Bretylium Tosylate and Lidocaine in patients with ventricular irritability following acute myocardial infarction; a review of patients with heart failure in acute myocardial infarction; a review of patients with heart block; telephone transmission of electrocardiograms; monitoring suspected myocardial infarction patients in an ambulance. Dr. W.A. Mahon (ТГН): cardiovascular effects of beta-adrenergic blocking agents (with Dr. J. Morch); distribution, metabolism, and excretion of tritiated doxycycline in man; development of radioimmunoassay for measuring digoxin. Dr. J.E. Morch (ТГН): myocardial blood flow using $^{133}\text{Xenon}$ washout technique; study of total correction of Tetralogy of Fallot in adults; haemodynamic studies of a new beta-blocking drug, Aptin; renal blood flow measured by $^{133}\text{Xenon}$ washout technique. Dr. N.J. Petkovich (ТВН): setting up a vectocardiograph and phenocardiography laboratory to study various cardiac conditions. Dr. D.L. Watt (ТГН): study of whole blood clotting time in polystyrene tubes in the assessment of hypercoagulable states. Dr. E.D. Wigle (ТГН): study of the natural history of muscular subaortic stenosis; development of a computerized technique for determination of left chamber volumes during cineangiography; study of mitral valve anatomy; study of disease resulting from rupture of chordae tendineae of the mitral valve. Dr. J.K. Wilson (СМН): laboratory studies in the response to exercise of the transplanted heart; studies of patients with the systolic click and late systolic murmur syndrome; study of patients with heart block and rheumatoid spondylitis. Dr. T.T. Zsoter (ТВН): pharmacology of the heart and blood vessels with particular reference to venomotor reflexes; study of the effects of contraceptive drugs in the veins.

Community Medicine

Dr. R. Perkins (ТВН): studies of viral and bacterial infections of the nose and throat; a study of local community needs.

Dermatology

Dr. H.J. Donsky (ТГН): use of complamin in vitiligo, griseofulvin and psoriasis; investigation of skin disorders with the electron microscope. Dr. H.F. Haberman (ТВН): study of tyrosinase; study of porphyrin abnormalities in patients with photosensitivity. Dr. V.P. Varadi (ВН): chemistry of connective tissues during embryonic development in health and disease; study of connective tissue changes in the skin prematurely aged from chronic sunlight exposure.

Epidemiology

Dr. B. Berris (NMSH): aetiology of enlarged parotid glands in Diabetes Mellitus. Dr. C. Ezrin (ТГН): various aspects of pituitary cytology; effects of variations of thyroxine binding globulin capacity in the disappearance of triodo-thyronine from the plasma (study with Dr. R. Volpe); study of patients with pituitary disease (with Dr. B. Webster). Dr. H.P. Higgins (СМН): study of a case of thyrotoxicosis due to a potent thyroid stimulator originating from a hydatidiform mole; study of the viral aetiology of subacute thyroiditis; investigating the role of calcitonin in a patient with idiopathic juvenile osteoporosis (with Dr. A. Guansing). Dr. D.W. Killinger (ВН): metabolism of dehydroisoandrosterone sulphate during caloric restriction; biosynthesis of 11- β -hydroxyandrostenedione. Dr. J.C. Laidlaw (ТГН): studies of patients with "glucocorticoid-remediable aldosteronism"; aldosterone-suppressing action of glucocorticoid hormone and heparin. Dr. D.L. Schatz (ТВН): effect of heparin in thyroid function. Dr. R.H. Sheppard (ТВН): radioisotope studies in patients with narrowed renal arteries; measurement of growth hormone in patients with pituitary tumours and correlating this finding with skin thickness; study of patients with obstructive jaundice using radioactive Rose Bengal. Dr. R. Volpe (ВН): stimulation of bovine thyroid cells in isolated cell suspension; thyroid hormone kinetics; population studies in Graves' disease. Dr. P.G. Walfish (NMSH): studies of the effect of beta adrenergic blockade on the metabolic effects of tolbutamide; role of beta adrenergic receptors in the secretion of insulin and growth hormone; development of tests for the diagnosis of adrenal,

pituitary, and thyroid disease. Dr. B. Webster (TGH): studies on human thyrotropin; development of a radioimmunoassay for serum T_3 determinations; study of anti-diuretic effect of chlorpropamide in patients with diabetes insipidus.

Gastroenterology

Dr. J.R. Bingham (TWH): gastric secretion and its control. Dr. N. Diamant (TWH): study of the characteristics of gastrointestinal muscle and in particular the mechanisms which control and co-ordinate activity of the muscle. Dr. S.V. Feinman (NMSH): immunoglobulins in human bile; isoenzymes of lactic dehydrogenase in various diseases. Dr. G.G. Forstner (TWH): study of the intestinal barrier; study of renal function in patients with severe alcoholic liver disease. Dr. K.N. Jeejeebhoy (TGH): determination of the controlling factors of a liver-made plasma protein synthesis and the effect of alcohol on such synthesis (with Dr. A. Bruce-Robertson); determining the effects of primary protein malnutrition; developing methods for the measurement of medium chain triglycerides in fecal fats and also the measurement of bile salt excretion. Dr. M.M. Fisher (TGH): studies of the intrahepatic phase of bile acid metabolism using the isolated rat liver as the major experimental tool.

Haematology and Cancer

Dr. A. Becker (PMH): biochemical basis of genetic recombination. Dr. A. Bruce-Robertson (TGH): with Dr. K. Jeejeebhoy has set up a method to estimate the synthesis rates of liver-made plasma proteins and the effect of alcohol on this synthesis. Dr. D.E. Bergsagel (PMH): study of the physical characteristics and nutritional requirements of a tumour stem cell; clinical trial of the effectiveness of radiation alone in radiation plus cyclophosphamide in the treatment of localized lung cancer. Dr. D.H. Cowan (PMH): development of human bone marrow transplantation; study of short term *in vitro* lymphocyte cultures; pulse height analysis of red blood-cell size and frequency distribution. Dr. J.H. Crookston (TGH): studies of hereditary dyserythropoietic anaemia, transplantation immunology of the heart, the Ii blood group system, abnormal haemoglobins and a blood group chimera with unusual Lewis group; production has begun of anti-dog lymphocyte serum. Dr. H.A. Farquharson (TGH): study of murine lymphoma. Dr. M.B. Garvey (SMH): intravascular coagulation with particular interest in the microangiopathic haemolytic anaemias; effects of alteration of platelet adhesiveness on femoral popliteal graft survival. Dr. G.D. Hart (TEGH): clinical trials of chemotherapeutic agents; blood groups in skeletal remains of ancient man. Dr. J.W. Meakin (PMH): investigation of an androgen-dependent mammary tumour to determine the cellular basis of androgen dependence; assessing results of ovarian irradiation and prednisone following mastectomy for carcinoma of the breast; effects of chemotherapeutic agents on carcinoma of the breast; immunization of patients with diazotized extracts of their own tumours. Dr. H. Meindok (TWH): study of folic acid blood levels. Dr. E.A. McCulloch (PMH): study of hemopoietic stem cells and their early differentiated descendants. Dr. J.G. Scott (TGH): study of Hageman Factor deficiency in a family; review of 21 cases of smouldering acute leukemia. Dr. J. Senn (SBH): evaluation of a chronic care population from a haematologic viewpoint; evaluation of methylhydrazine in lymphoma therapy and desferrioxamine in iron storage disorders. Dr. D.A. Dotten (WH): lipid metabolism in stimulated lymphocytes. Dr. K.R. Butler (SMH): study of patients with chronic lymphocytic leukemia. Dr. R.E. Alison (PMH): clinical trials of therapeutic agents; value of local or regional radiation in early Hodgkin's Disease.

Metabolism and Diabetes

Dr. A. Angel (TGH): Lipid compartmentation in adipose cells; ATP metabolism in adipocytes in relation to the lipolytic process; isolation and characterization of adipose cell plasma membrane; cholesterol storage and mobilization in human skin and dyslipoprotein states. Dr. B. Birchwood (WCH): study of changes in serum lipids following acute myocardial infarction; study of obesity; development of laboratory methods for serum lipids. Dr. N. Forbath (TGH): myocardial lactate metabolism; lactate turnover

rate; insulin immunoassay. Dr. G.L.A. From (TWH): determination of serum levels of insulin and growth hormone association. These techniques are being used to study glucose metabolism in two types of patients (1) recent myocardial infarction; (2) normal pregnancy. Dr. J.E. Harrison (TGH): study of calcium metabolism in patients with metabolic bone disease using radioactive calcium tracer techniques. Dr. A.B. Kenshole (WCH): study of aging in normal healthy women. Dr. J.A. Little (SMH): comparison of sulphated and lente beef insulin; comparison of lente and maleyl beef insulin; study of the incidence of hyperlipoproteinemia among first degree relatives of probands with Types I-V hyperlipoproteinemia; study of effects of various diets on serum lipid levels of hyperlipoproteinemic patients; comparison of coffee and Sanka and their effect in patients with ischemic heart disease. Dr. G. Steiner (TGH): effect of insulin in fatty acid synthesis; effects of thyroid hormone in the metabolic activity of brown adipose tissue; investigating the synthesis of the protein portion of the lipoprotein in hyperlipoproteinemias.

Neurology

Dr. R.M. Armstrong (TGH): ultra structural studies of two cases of central core disease and two cases of Type II glycogenosis; structure of myosin filament; study on an experimental model of the inflammatory myopathies. Dr. H. Berry (SMH): clinical electrophysiologic correlation in lesions and injuries of the peripheral nerve and in clinical neuro-ophthalmology; investigation of the neurological, psychological, and psychiatric aspects of a series of children with perceptual disorders, with Drs. J. Wilkes and L. Lazar; investigating the use of retinal fluorescein angiography in various conditions involving the eye. Dr. D.R. Crapper (TGH): role of cytoplasmic microtubules in the electrical and transmitter properties of neuronal membranes; study of the reticular mediated alterations in lateral geniculate spike activity. Dr. T.A. Gray (SMH): clinical trial of new drugs in the treatment of migraine. Dr. M.E. Hill (TGH): study of the use of L-dopa in the treatment of Parkinson's Disease. Dr. O. Kofman (NMSH): clinical study of the use of L-dopa in Parkinson's disease. Dr. R.G. Lee (TWH): studies in the electrical activity of the nervous system, utilizing computer techniques. Much of the work is concentrated in the field of epilepsy. Dr. J.G. Humphrey (TGH): histological and physiological studies of a wide variety of clinical neuromuscular disorders; use of azothioprine in inflammatory myopathies; use of ACTH in the treatment of Bell's palsy. Dr. R.D. MacDonald (WH): ultra-structural anatomy of Z-discs of skeletal muscle and of nemaline rods; ultra-structural and immunological studies of inflammatory myopathies (with Dr. R.M. Armstrong). Dr. R.S. McPhedran (WH): effect of specific filters on photosensitive epileptics; the effect of Procaine infusion on resting EEG patterns; definition of the anterior horns of the lateral ventricles in modified ultrasound A scan technique. Dr. J.R. Wherrett (TGH): the role of glycosphingolipids in cell membranes; studies in adult lipidosis; chemical events during growth and myelination of peripheral nerves.

Nuclear Medicine

Dr. D.E. Wood (TGH): the newly set up whole body counter is being used on projects involving calcium, copper, cobalt, iron, and potassium; participated with Dr. Aspin and Dr. Levinson in the study of fibrocystic disease with radionuclides; retrospective studies of various scanning procedures.

Rehabilitation

Dr. W.M. Franks (TWH): rehabilitation after heart attacks. Dr. W.J. Reynolds (TWH): clinical studies on inflammation of joint linings; X-ray studies of tendon sheaths.

Renal Disease

Dr. G.A. deVeber (TWH): with Dr. A. Rapoport and Dr. D. Oreopoulos is studying renal osteodystrophy in patients with chronic renal failure; immunosuppressive therapy in Glomerulonephritis; clinical and laboratory studies of patients undergoing renal dialysis and kidney transplantation. Dr. S.S.A. Fenton (TGH): patterns of infection in

A-v cannulas; effect of uremia and intensive haemo-dialysis on albumin synthesis (with Dr. K.N. Jeejeebhoy); survey for hepatitis antigen (with Dr. M.M. Fisher and Dr. J. Sinclair). Dr. M. Johnson (SMH): study of patients with calcium forming stones. Dr. A. Rapoport (TWH): studies of tests of kidney function to standardize and improve their accuracy; studies of bone disease with particular reference to resorption of bone. Dr. G.W. Smith (WH): study of the kidneys of diabetic patients with fluorescent insulin. Dr. D.R. Wilson (TGH): pathogenesis of urine acidification defects and of phosphaturia after renal transplantation; studies of patients with renal tubular disorder and renal calculi; pathophysiology of chronic obstructive nephropathy using micropuncture and clearance experiments.

Respiratory

Dr. G. Copland (SBH): study of various aspects of both anatomic and physiologic dead space during exercise and the relationship of steady state gas transfer capacity to other parameters of cardiopulmonary function; studies of the drugs Bisolvon and Intal. Dr. F. Douglas (SMH): the effect of intermittent positive pressure breathing therapy in the mechanical properties of the lung; effect of obesity in the mechanics of breathing; physiological adaptation to work in a patient following cardiac homo-transplant. Dr. S.W. Epstein (TWH): clinical evaluation of a new drug Carbenacillin. Dr. E.S. Lilker (SJH): studies of muco-ciliary transport in the airways of dogs; measurement of "effective" pulmonary collateral circulation in dogs. Dr. C.R. Woolf (TGH): respiratory effects of smoking in women; evaluation of surgical treatment of emphysema; effects of variation of instantaneous rate of change of transpulmonary pressure; flow volume curves in normal women; measurement of specific conductance in patients with tracheal stenosis (with Dr. F.G. Pearson); comparison of intermittent positive pressure breathing and nikethamide drips in acute respiratory failure of chronic obstructive lung disease; the effect of common activities in the breathing pattern in patients with chronic obstructive lung disease; the effect of temperature on blood with very high oxygen tension, *in vitro* studies.

Rheumatology

Dr. D.A. Gordon (WH): microbiological, serological studies of patients with rheumatoid arthritis and related rheumatic diseases (with Dr. A.E. Franklin). Dr. J.B. Houpt (NMSH): tryptophan metabolism in collagen diseases; effect of allopurinol on renal lithiasis; elucidation of techniques for determination of plasma oxypurines; synovial fluid analysis and correlation with disease. Dr. D.D. McCarthy (TGH): therapeutic trial of the drug Glifinan. Dr. M.A. Ogryzlo (WH): quantitation of the immunoglobulins in the rheumatic diseases (with Drs. Gordon and Pruzanski); structure and function of immunoglobulins as correlated to therapeutic response in myeloma (with Drs. Pruzanski and Bergsagel); tryptophan metabolism in corrective tissue diseases (with Dr. J. Houpt); effect of allopurinol on uric acid metabolism in gout (with Dr. J. Houpt). Dr. H.A. Smythe (WH): assay of xanthine oxidase in liver and bone marrow by an isotopic technique; assay of HGPRTase in red cells, marrow, and liver; with Dr. J. Blakely, the effects of sulfinpyrazone on vascular disease; with Dr. M. Urowitz, the effects of Imuran on rheumatoid disease; population survey for prevalence of ankylosing spondylitis in B.C. Indians (with Dr. J.B. Goften); investigation of hyperuricemic population of Malaysian aborigines (with Dr. J.D. MacLean). Dr. M.B. Urowitz (WH): correlating the pressure of free DNA, anti-DNA antibody, complement and other immunologic parameters in serum and synovial fluid with clinical activity in patients with SLE; study of azathioprine therapy in rheumatoid arthritis; role of soluble complexes in the pathogenesis of connective tissue diseases (with Dr. I. Broder).

HONOURS

DR. D.E. BERGSAGEL, appointed to Chemotherapy Advisory Committee, National Cancer Institute, U.S.A.

DR. R. BLADEK, President Elect, Ontario Thoracic Society.

DR. M.M. FISHER, member, New York Academy of Sciences.

DR. W.H. FRANCOMBE, President, Ontario Antibody Club.

DR. D.A. GORDON, President, Clinical Research Society of Toronto.

DR. C.K. GORMAN, President, Toronto Diabetes Association, 1969-70.

DR. H. HABERMAN, Canadian Dermatological Association, award for Contributions to Dermatology, 1970.

DR. M.D. JOHNSON, Visiting Lecturer, University of Honduras, Tegucigalpa, Honduras.

DR. A. KNIGHT, President, Canadian Society of Allergy and Clinical Immunology.

DR. E.A. McCULLOCH, awarded Annual Gairdner Award.

DR. J.E. MORCH, Chairman, Canadian Cardiovascular Society.

DR. D.E. WOOD, President, Eastern Great Lakes Chapter, Society of Nuclear Medicine.

SCHOLARLY ADDRESSES

DR. A.G. ADELMAN, "The Clinical Spectrum of Sudden Severe Mitral Regurgitation," Royal College of Physicians and Surgeons of Canada, Montreal; "Mitral Regurgitation in Muscular Subaortic Stenosis," American College of Cardiology, New Orleans, Louisiana.

DR. H.E. ALDRIDGE, "Repair of Secundum Atrial Septal Defect in the Disabled Patient Over Thirty Five Years of Age" (with Dr. F. Saksena), 22nd Annual Meeting, Canadian Cardiovascular Society; "Classification of Left Ventricular Aneurysm" (with Dr. J.A. Key and Dr. D.C. MacGregor), 22nd Annual Meeting, Canadian Cardiovascular Society; "Direct Myocardial Revascularization Sephenous Vein Bypass Grafts to the Distal Coronary Artery - Technical Details and Post-operative Hemodynamics" (with Drs. P. Field, A.S. Trimble, R. Trobridge), Annual Meeting of the Society of Thoracic Surgeons, Atlanta, Georgia.

DR. A. ANGEL, "The Effect of Lipolytic Agents on ATP Metabolism in Adipose Tissue Cells," Third Workshop on Diabetes, Mont Gabriel, P.Q.; "The Effect of Norepinephrine, ACTH and Dibutyryl 3'-5' Cyclic AMP on ATP Metabolism in Adipose Cells," American Federation for Clinical Research, Chicago; "ATP Metabolism in Adipose Cells: Effects of Norepinephrine, ACTH and Dibutyryl 3'-5' Cyclic AMP," Canadian Society for Clinical Investigation, Montreal; "Metabolism of Brown and White Adipose Tissue," John S. Fawcett Colloquium on Perinatal Biology, Montreal; "Reduction in Adipocyte ATP by Lipolytic Agents: Relation to Intracellular FFA Accumulation, 14th International Conference on the Biochemistry of Lipid, Lund, Sweden.

DR. D.S. BEANLANDS, "Propranolol in Angina Pectoris," Clinical Research Society, Toronto; "Emergency Management of Acute Infarction," Lakehead Summer School, Dryden; "Management of Arrhythmias," Lakehead Summer School, Dryden; "Complete Heart Block in Acute Myocardial Infarction," the American College of Physicians, Upstate New York and Ontario Regional Meeting, Toronto.

DR. D.E. BERGSAGEL, "Growth Characteristics of a Plasma Cell Tumor *in vivo* and *in vitro*," Patterson Laboratories, Manchester, England; "Management of Patients with Plasma Cell Myeloma," American Society of Hematology, Cleveland; "A Comparison of X-irradiation along with X-irradiation plus Cyclophosphamide in the Treatment of Lung Cancer," Yale University, New Haven, Connecticut; "Cell Kinetics and Solid Tumor Chemotherapy; Multiple Myeloma: Clinical Course and Treatment; Myeloma as a Biochemical Model of Cancer: Clinical and Experimental," Tenth International Cancer Congress, Houston, Texas.

DR. B. BIRCHWOOD, "The Effect of a Team Approach on Weight Reduction," Federation of Biological Societies.

DR. I. BRODER, "Release of Histamine by Rheumatoid and Non-rheumatoid Synovial Fluids," Canadian Rheumatism Association; "Prospective Observations on the Incidence of Bronchial Asthma and Allergic Rhinitis in the Entire Community,"

American Academy of Allergy, New Orleans; "Comparison of Histamine Release by Anaphylatoxin and by Soluble Immune Complexes," American Association of Immunologists, Atlantic City; "Immunoglobulin Complexes in Serum and Synovial Fluid of Persons with Rheumatoid Arthritis," Clinical Research Society of Toronto; "The Extra-articular Features of Rheumatoid Arthritis," Interurban Arthritis Club, Pittsburgh; "Prospective Study of the Rheumatoid Biologically Active Factor – the Second Assessment," American Rheumatism Association, Detroit.

DR. K.W.G. BROWN, "Control of Atrial Arrhythmias in Acute Myocardial Infarction," American College of Cardiology, New York; "Control of Congestive Heart Failure in Acute Myocardial Infarction," American College of Cardiology, New York; "The Coronary Unit," University of the West Indies, Kingston, Jamaica.

DR. L. CASELLA, "Response to Exercise of the Human Transplanted Heart" (with Drs. F. Douglas, P. Forbath, M. Cheung, J. Yao, J.K. Wilson), Canadian Cardiovascular Society, Quebec.

DR. W.T.W. CLARKE, "General Management of Patients with Diabetes Mellitus," Symposium on Diabetes, University of Manitoba and the Canadian Diabetic Association, Winnipeg.

DR. G.M. COPLAND, "High Speed Drill Biopsy of the Lung," Ontario Thoracic Society.

DR. D.H. COWAN, "The Lymphocyte," Canadian Society of Laboratory Technicians; "A New Approach to Bone Marrow Transplantation in Man," Second Clinical Cancer Research Conference, Lake Couchiching; "Separation of Human Bone Marrow by Velocity Sedimentation," Bone Marrow Transplantation Meeting, Baltimore, Maryland.

DR. J.S. CRAWFORD, "Incidence of Venous Thrombosis of the Upper End of the Femur," Canadian Congress of Physical Medicine and Rehabilitation, Halifax.

DR. J.H. CROOKSTON, "Introduction to Tissue Transplantation," Canadian Society of Laboratory Technologists, Toronto; "A New Look at Old Blood Groups," Royal College of Physicians and Surgeons of Canada, Montreal; "Abnormalities of Erythrocyte Membrane in Congenital Dyserythropoietic Anemia," International Congress of Clinical Pathology, Montreal; "Red Cell Membrane Abnormalities in Hereditary Erythroblastic Multinuclearity," American Society of Hematology, Cleveland.

DR. D.R. CRAPPER, "The Functional Significance of Neurofibrillary Tangles," University of Western Ontario, London; "Neurofibrillary Tangles and Altered Electrical Activity," Canadian Congress of Neurological Sciences; "Mesencephalic Reticular Modulation of Lateral Geniculate Neurons" (with Dr. W.G. Tarron), Canadian Physiological Society; "Temporal Distribution of Mesencephalic Modulation of Lateral Geniculate Neurons" (with Dr. W.G. Tarron), Canadian Congress of Neurological Sciences.

DR. G.A. DEVEBER, "Current Aspects of Tissue Transplantation," Life Insurance Medical Directors of North America, Quebec City.

DR. N. DIAMANT, "Computer Simulation of the Intestinal Slow-Wave Frequency Gradient," Canadian Association of Gastroenterology, Montreal.

DR. H.J. DONSKY, "Lecture Tapes in Dermatology," First Joint Mexican-Canadian Dermatology Meeting.

DR. S. DUBISKI, "Determinative Mechanisms in Immunological Differentiation," Symposium of the Canadian Society for Immunology, Edmonton; "Allotypic Suppression in Rabbits: Operational Definition of the Target Cells," Lund, Sweden.

DR. M. EDMONDS, "The Effect of Globulin and Lymphocytes on Bovine Thyroid Cells in Suspension," American Thyroid Association, Chicago.

DR. C. EZRIN, "The Pituitary Confederation at the Maimonides Hospital," Bronx Medical Centre.

DR. M.M. FISHER, "Lithocholate Induced Cholestasis in the Perfused Rat Liver," American Association for the Study of Liver Disease.

DR. W.M. FRANKS, "Meralgia Parasthetica," Canadian Association of Physical Medicine and Rehabilitation, Halifax.

DR. D. GORDON, "Medical Management of Arthritis," College of Family Practice of Canada and Royal College of General Practitioners.

DR. W.F. GREENWOOD, "The Coexistence of Aortic Valve Disease and Coronary Artery Disease" (with Drs. S. Mecci, L.E. Alday, J. McLoughlin), Canadian Cardiovascular Society, Quebec.

DR. H. HABERMAN, "Tyrosinase in Melanoma," Canadian Dermatological Association.

DR. H.P. HIGGINS, "A New Thyroid Stimulator in a Thyrotoxic Patient with Hydatidiform Mole," Can. Society for Clinical Investigation; "Two Cases of Thyrotoxicosis due to Hydatidiform Mole: Evidence for a New Thyroid Stimulator," Royal College of Canada.

DR. M.E. HILL, "Parkinson's Disease - With Particular Emphasis on Speech," Ontario Speech and Hearing Association Annual Convention; "Newer Aspects in the Treatment of Parkinson's Disease," Oshawa Clinic Days, Oshawa; "Progress in the Treatment of Parkinson's Disease," Toronto Parkinson Chapter.

DR. T. HOLMES, "Pharmacology of the Respiratory System," McMaster University, Hamilton.

DR. J.G. HUMPHREY, "Spontaneous Activity in Electromyography," VII International Congress of Electroencephalography and Clinical Neurophysiology, San Diego, California; "Electromyographic Findings in Certain Hereditary Myopathies," VII International Congress of Electroencephalography and Clinical Neurophysiology, San Diego, California; "Disorders of Neuromuscular Transmission," Combined Session of the Royal College of Canada, Montreal.

DR. K.N. JEEJEEBHOY, "Treatment of Crohn's Disease," Peterborough Medical Society.

DR. A. KNIGHT, "Current Concepts in Clinical Immunology," Saskatchewan Medical Association, Saskatoon; "Hypogammaglobulinemia, Impaired Cellular Immunity and Progressive Multifocal Leukoencephalopathy," Canadian Society of Allergy and Clinical Immunology, Ottawa.

DR. O. KOFMAN, "Treatment of Multiple Sclerosis, Past, Present, and Future," Ontario Multiple Sclerosis Society, London, Ontario; "The Use of L-Dopa in Parkinson's Disease," University of Western Ontario, London, Ontario.

DR. W.J. KOSTUK, "Complete Heart Block in Acute Myocardial Infarction," Ontario Medical Association, Buffalo, and also to American College of Physicians, Regional Meeting, Toronto; "Prophylactic Lidocaine in Acute Myocardial Infarction," American Heart Association, Dallas, Texas.

DR. J.C. LAIDLAW, "Hypertension and Increased Aldosterone Secretion," Symposium in honour of Prof. J.S.L. Browne, McGill University, Montreal.

DR. M.M. LENCZNER, "Physical and Mental Health in the Tropics," Eastern Pentecostal Bible College, Peterborough; "Chronic Vesical Bilharziasis with Sclerosis and Calcification of Bladder and Bilateral Pyeloureterectasis," Ontario Parasitology Club; "Bicultural and bilingual: Canada's Role in External Aid," Rotary Club, St. Germain-en-Laye, France.

DR. S. LENKEI, "Bacterial Endocarditis Complicating Cardiac Valve Replacement," Canadian Cardiovascular Society, Quebec.

DR. E.S. LILKER, "IPPB, Its Use and Abuse," Ontario Thoracic Society Annual Meeting, Toronto; "Inhalation Therapy," Ontario Allergy Society, Toronto.

DR. J.A. LITTLE, "An Immunoassay of Insulin Bodies in Humans: Their development in Diabetics Treated with Sulphated or Lente Insulin," American Diabetic Association, St. Louis, Mo.; "Differences in Insulin Antibody Response in Diabetics Treated with Beef Lente or Sulphated Insulins," Canadian Federation of Biological Societies, Montreal.

DR. R. MACDONALD, "Experimental Chloroquine Myopathy," American Association of Neuropathology, New Haven; "Observations on Organization and Solubility Properties of z-disc Components," American Society for Cell Biology, Detroit.

DR. R.L. MACMILLAN, "Primary Ventricular Fibrillation in Acute Myocardial Infarction," Canadian Cardiovascular Society, Quebec; "Diet and Heart Disease," Ontario Heart Foundation Symposium, Toronto.

DR. W.A. MAHON, "The Anti-arrhythmic Effects of Bretylium," Canadian Cardiovascular Society, Quebec.

DR. J.T. MAROTTA, "Intermittent Claudication of the Cauda Equina," Canadian Neurological Society.

DR. D.D. MCCARTHY, "The Practical Aspects of Therapy of Rheumatoid Arthritis," Muskoka Medical Society, Bracebridge.

DR. J.McCONNON, "Simultaneous Comparative Studies of Thyroxine (T4) and Triiodothyronine (T3) Production Rates in Health and Disease," Sixth International Thyroid Conference, Vienna.

DR. E.A. McCULLOCH, "Myelopoiesis and Lymphopoiesis Compared at the Cellular Level," Canadian Federation Biological Society, Edmonton, Alberta; "A New Approach to Bone Marrow Transplantation in Man," Second Clinical Cancer Research Conference, Lake Couchiching; "Cellular Interaction in the Regulation of Hemopoietic Progenitor Cells," St. Elizabeth's Hospital, Brighton, Mass.; "*In Vitro* techniques in Mice and Man," Bone Marrow Culture Conference, National Institutes of Health, Bethesda, Maryland; "Cellular Events in Hemopoiesis," Trent University, Peterborough; "Hematopoietic Cellular Differentiation: A problem at the Interface between Biology and Medicine," University of Tennessee, Memphis.

DR. W.J. McILROY, "Neurological Complications Seen in Open Heart Surgery," Royal College of Physicians and Surgeons of Canada, Montreal; "Recent Views on Multiple Sclerosis," Multiple Sclerosis Society of Canada, Montreal.

DR. R.S. MCPHEDRAN, "Combined EEG and Echogram Study in CNS Lesions," Canadian Neurological Congress.

DR. J.E. MORCH, "Surgery in the Aged: Cardiological Aspects," Royal College of Physicians and Surgeons of Canada, Regional Meeting, Thunder Bay, Ontario; "Investigation of Patients with Coronary Artery Disease and Selection for Surgery," King Edward VII Hospital, Hamilton, Bermuda; "Eisenmenger Syndrome: Analysis and Natural History in Adults," Ontario Heart International Symposium on Natural History and Management of Congenital Heart Disease; "Follow up Studies of Tetralogy of Fallot Correction in Adulthood," Canadian Cardiovascular Society, Quebec.

DR. M.A. OGRYZLO, "Immunologic Aspects of SLE, Ukrainian Medical Association, Toronto.

DR. J.S. OLIN, "The Back: Unusual Clinical and Laboratory Manifestations," College of General Practice.

DR. D. OSOBA, "Separation of Cells Involved in Primary Immune Responses," Annual Meeting of the Canadian Society for Immunology, Edmonton; "Studies on Host Immunity," Second Clinical Cancer Research Conference on the Ontario Cancer Treatment and Research Foundation, Lake Couchiching; "Primary Immune Responses in Cell Culture," Montreal Antibody Club, Montreal; "Immunological Deficiency with High Sweat Chlorides," Annual Meeting of the Royal College of Physicians and Surgeons of Canada, Montreal; "Cellular Cooperation in the Primary Immune Response," Annual Meeting of the Canadian Society of Allergy and Clinical Immunology, Ottawa; "Cellular Interaction and the Immune Response," Annual Meeting of the Ontario Antibody Club.

DR. J. PETKOVICH, "Recognition and Treatment of Cardiac Arrhythmias in a Coronary Care Unit," University of Kansas Medical School, Kansas.

DR. W. PRUZANSKI, "Muramidase (Lysozyme) Estimation in Serum and Synovial Fluid of Patients with Rheumatoid Arthritis," Canadian Rheumatism Association, Toronto; "Structural Anomaly of IgG-1/L Cryoglobulin," Canadian Federation of Biological Societies, 12th Annual Meeting, Edmonton, Alberta; "The Significance of Lysozyme (Muramidase) in Rheumatoid Arthritis. Levels in Serum and Synovial Fluids," American Rheumatism Association, Tucson, Arizona.

DR. A. RAPOPORT, "The Significance of Asymptomatic Proteinuria and Hematuria," Royal College of Physicians and Surgeons of Canada, Montreal; "Kidney Function: How we Measure it," University of Western Ontario, London.

DR. J.C. RICHARDSON, "Management of Head Injuries," Edinburgh and Madrid International Symposium on Head Injuries, Edinburgh.

DR. D.L. SCHATZ, "Simple Radiological Demonstration of Cortical Bone Loss in Thyrotoxicosis," Royal College of Physicians and Surgeons of Canada, Montreal.

DR. J. SENN, "Cell Culture of Human Bone Marrow: Development and Recent Experience," NIH, Bethesda, Maryland; "Kinetics of Regeneration of Human Marrow after Cyclophosphamide Assessed by a Cell Culture Method," Bone Marrow Conference, Baltimore, Maryland; "Leukemia Studied by a Colony Forming Cell Culture System," NIH, Bethesda, Maryland; "Cell Culture of Human Bone Marrow – Recent Developments," Symposium on Myelopoiesis and the Immune Response *In Vitro*, Kingston, Ontario.

DR. K.H. SHUMAK, "Histological and Immunological Features of Rejection in Canine Cardiac Allografts," Canadian Society for Clinical Investigation, Montreal; "Antibodies in the Serum and on the Heart of Dogs with Cardiac Allografts," the Clinical Research Society of Toronto, Toronto.

DR. H.A. SMYTHE, "Quantitation of Rheumatoid Deformity," Canadian Rheumatism Society, Toronto; "Synovectomy and Rheumatoid Arthritis," Canadian Orthopaedic Association; "Recent Advances in Gout," Royal College of Physicians and Surgeons of Canada, Toronto.

DR. J.L. STEIN, "Extra Articular Features of Rheumatoid Arthritis," Canadian Rheumatism Association, Toronto.

DR. G. STEINER, "Sympathetic Regulation of Brown Adipose Tissue (BAT) Metabolism," Canadian Physiological Society, University of Alberta, Edmonton; "Immunosympathectomy, A Tool in Studying Carbohydrate and Lipid Metabolism," International Congress of Neurochemistry Milan, Italy; "Peripheral Sympathetic Ganglia in Brown Adipose Tissue, Pharmacologic Evidence," Federation of American Societies for Experimental Biology, Atlantic City; "Effect of Thyroid Status on Brown Fat Metabolism," Canadian Physiological Society, Montreal.

DR. J.T. SUERO, "Breathing Pattern in Chronic Obstructive Lung Disease," Annual Meeting, Ontario Thoracic Society, Toronto; "The Breathing Pattern: Its Effects on the Distribution of Pulmonary Ventilation," the American College of Chest Physicians, 35th Annual Meeting, Chicago; "Lung Mechanics During Dyspnoea in Chronic Obstructive Pulmonary Disease," American Federation of Clinical Research, Washington, D.C.

DR. M.B. UROWITZ, "Relapsing Polychondritis – A Report of Two Cases," Canadian Rheumatism Association, Toronto.

DR. D.P. VARADI, "Treatment of Raynaud's Phenomenon," Third Canadian Conference on Research in the Rheumatic Diseases; "Role of Elastase in Dermatologic Disease," Annual Meeting, Canadian Dermatologic Society; "Chemical Studies on Elastin," National Meeting, American Federation for Clinical Research, Atlantic City; "Elastin in Embryonic Tissues," Society of Investigative Dermatology, Atlantic City; "Chemistry of Connective Tissues," University of Alabama, Birmingham, Alabama.

DR. D.L. WATT, "Prinzmetal's Variant Form of Angina with Arteriographic Evidence of Coronary Artery Spasm," Ontario Medical Assoc.

DR. B. WEBSTER, "Specificity of Antisera to Human Thyrotropin: Qualitative and Quantitative Variants," Seventh Acta Endocrinologica Congress, Stockholm, Sweden; "The Radioimmunoassay of Human Thyrotropin: Clinical and Experimental Applications," Royal Society of Medicine, Endocrine Section, London, England; "Heterogeneity of Human Thyrotropin as Identified by Radioimmunoassay and Iso-electric Focusing Methods," University of Cambridge, Cambridge, England; "Advances in the Diagnosis and Treatment of Thyroid Disease," Muskoka Medical Society; "Biological and Immunological Properties of Human Thyrotropin Preparations," National Institute for Medical Research, Medical Research Council, Mill Hill, London, England; "The Radioimmunoassay of Human Thyrotropin: Experimental Studies," University of London, Middlesex Hospital; "Reference Preparations of Human Thyrotropin: Comparative Stability of Biological and Immunological Potencies," Sixth International Thyroid Congress, Vienna.

DR. J.R. WHERRETT, "Studies in Adult Neurovisceral Lipidosis," University of Colorado Medical Center; "Studies in Cerebral Lipidosis of Late Onset," Children's Psychiatric Research Institute, London.

DR. E.D. WIGLE, "The Clinical Course of Muscular Subaortic Stenosis: Effect of Medical and Surgical Therapy," International Symposium on Natural History of Congenital Heart Disease, Toronto.

DR. J.K. WILSON, "Rehabilitation Following Cardiac Transplantation," Second World Symposium on Heart Transplantation, Montreal.

DR. C.R. WOOLF, "Preoperative Evaluation of Patients with Chronic Obstructive Lung Disease," State University of New York, Buffalo; "Surgery of Emphysema," Ontario Thoracic Society Ninth Annual Meeting; "Intermittent Positive Pressure Breathing," Ontario Thoracic Society Ninth Annual Meeting; "Management of Pulmonary Failure," Thirty-Fifth Annual Meeting, American College of Chest Physicians, Chicago; "The Effect of Regular Cigarette Smoking in Women," the Royal College of Physicians and Surgeons of Canada; "The Effect of Chronic Cigarette Smoking in Women," the Second Research Conference on Tobacco and Health for Grantees of the Committee for Research on Tobacco and Health for the AMA-ERF, Scottsdale, Arizona.

DR. D.M. YOUNG, "Technologist Training in Ontario," Canadian Society of Laboratory Technologists; "The Biological Basis for Organizational Chaos in the Applied Arts," Canadian Chapter, American Society for Cybernetics; "The Medical Laboratory Situation: or, The Problem of Heading Off a Runaway," Connecticut Association of Pathologists, New Haven, Conn.; "The Biological Basis for Organization Chaos in the Applied Arts, i.e. Health and Education, With Some Thoughts bearing on Remedial Action," Yale University, New Haven, Conn.

DR. T.T. ZSOTER, "The Effect of Benzothiadiazides on Veins," 4th International Congress of Pharmacology, Basel; "Effect of Hypoxia on the Vascular Response to Isoproterenol and Norepinephrine," Canadian Federation of Biological Societies, Montreal.

VISITORS

Dr. J.W. Adamson, Seattle, Washington; Dr. R. Agnew, Saskatoon, Saskatchewan; Dr. G.B. Ansell, Birmingham, England; Dr. D.F. Austen, Boston, Massachusetts; Dr. M. Bouvier, Lyons, France; Dr. J. Burdine, Houston, Texas; Dr. Y. Clermont, Montreal, Quebec; Dr. E. Diener, Victoria, Australia; Dr. F. Dixon, LaJolla, California; Dr. B. Gallier, Brisbane, Australia; Dr. R.A. Gatter, Abington, Pennsylvania; Dr. F.C. Greenwood, Hawaii; Dr. T.C. Hall, Rochester, New York; Dr. J. Henderson, Edinonton, Alberta; Dr. A. Khaliq, Edmonton, Alberta; Dr. M. Legrain, France; Dr. E. LeJeune, Lyons, France; Dr. Clara Lowy, London, England; Dr. J.A. Mathews, London, England; Dr. Wolfgang Mempel, Munich, Germany; Dr. S. Meyerowitz, Rochester, New York; Dr. K.D. Muirden, Melbourne, Australia; Dr. W.J. Moon, Melbourne, Australia; Dr. A. Mowat, Oxford, England; Dr. J. Mulder, Malmo, Sweden; Dr. Selwyn Nelson, University of Sydney, Australia; Dr. Jesus Diaz Olivers, Mexico City, Mexico; Dr. R. Pannier, Ghent, Belgium; Dr. M. Saffran, Montreal, Quebec; Dr. P. Sonksen, Boston, Massachusetts; Dr. P. Sweterlitsch, Abington, Pennsylvania; Dr. B. Twardy, Abington, Pennsylvania; Dr. H. Wagner, Johns Hopkins University, Baltimore, Maryland.

PUBLICATIONS

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- ALISON, R.E. "A New Look in Cancer Education" (*Canadian Family Physician*, vol. 15, 1969, pp. 37-9).
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- "Reliability of Ultrasound in Diagnosis of Hypertrophic Subaortic Stenosis" (*Clinical Research*, vol. 18, 1970, p. 329) (abstract).
- WILSON, D.R. "The Effect of Papillectomy on the Renal Response to Extracellular Volume Expansion" (*Clinical Research*, vol. 17, 1969, p. 675) (abstract).
- "Faecal and Salivary Electrolytes in the Diagnosis of Primary Aldosteronism" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 3, 1970, p. 22) (abstract).
- "Micropuncture Study of Chronic Obstructive Neuropathy" (*Clinical Research*, vol. 18, 1970, p. 520) (abstract).
- WILSON, D.R. *et al.* "The Prevention of Acute Renal Failure in the Rat by Long Term Saline Loading: A Possible Role in the Renin-Angiotensin Axis (33937)" (*Proceedings of the Societies for Experimental Biology and Medicine*, vol. 131, 1969, pp. 610-14).
- WOOLF, C.R. and SUERO, J.T. "Audio Control of Tidal Volume in the Measurement of Pulmonary Diffusing Capacity" (*American Review of Respiratory Disease*, vol. 100, 1969, 99-100).
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- YOUNG, M. "Approach to Multiple Chemical Screening in the Toronto General Hospital"; in *Multiple Laboratory Screening*, ed. Benson and Strandjord, pp. 227-43. New York: Academic Press, 1969.
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OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor W.M. Paul

Curriculum planning for our major responsibility in Reproduction and Neonatology is complete, and the department acknowledges the work of Professor C.A. Woolever for its direction.

With the Division of Postgraduate Medical Education, the department produced refresher courses for specialists and general practitioners.

The departmental submission to the Independent Planning Committee was accepted. However, the initiation of these plans awaits the proposal of a spending

plan for moneys allocated for this purpose. Intimately involved with these plans is a delineation of the relationship between University and University-affiliated hospitals and our staff which functions in each. It is fair to say, I think, that the physical facilities required to upgrade the clinical school are of secondary importance to the quality and enthusiasm of the teaching staff. The relationship of the staff to the University and the hospitals must be clarified to their satisfaction before the atmosphere will allow for progress in other areas.

Dr. R.H. Wesley has transferred from the Toronto Western Hospital to Sunnybrook Hospital as the Acting Head of the department. We are pleased to welcome Dr. Robert Gall to the staff at the Women's College Hospital. Dr. Richard Wilson continues as Director of the Health Sciences Functional Planning Unit.

Dr. C.C. Gold, Dr. R.J. Colwill, Dr. G. Lickrish, and Dr. A.J. McMahon were made Fellows of the Royal College of Surgeons of Canada.

Dr. Carol Cowell, presently abroad on an Ontario Training Grant, has been awarded a Canada Life Insurance Medical Fellowship for a term of five years. She returns to our department next year.

Professor R.B. Meiklejohn will retire as Head of the department at the Toronto Western Hospital. Happily, he will continue to teach in that department. Dr. Meiklejohn has served this department over the years at St. Michael's Hospital, the Wellesley Hospital and latterly as Head at the Toronto Western Hospital. He has made a real contribution to our clinical and academic life which we gratefully acknowledge.

The department was honoured by visits from Professor Lance Townsend, University of Melbourne, Australia; Dr. John A. Loraine, Honorary Consultant Endocrinologist at the Royal Infirmary, Edinburgh, Scotland; and Dr. Geoffrey S. Dawes, Director of the Nuffield Institute for Medical Research, University of Oxford, England.

My term as Chairman of the department ends during this year. The past five years have been a time of planning and change. The academic and research component of our activity has increased without sacrificing a continuance of clinical excellence, and in this I take some pride. My fondest recollection of this time, however, will be the loyalty and support which my staff extended to me, and which never wavered.

We welcome Dr. John Harkins as the new Chairman of this department. Formerly an Assistant Professor, he brings with him the qualities which will bind us to him with confidence and trust.

RESEARCH

Dr. P.F. Beirne continues clinical studies on the use of ultrasound as a diagnostic technique.

Dr. Rudi Borth continues his studies on the methodology of assay for human gonadotrophins and the use of these assays in clinical studies.

Dr. Saul Cohen continues studies in conjugated estrogens. Of particular interest is his investigation of labile estrogens in pregnancy urine in a variety of clinical states.

Dr. T.A. Doran continues investigations in endometrial cytology and biochemical and cytologic studies of amniotic fluid.

Dr. D.J. Gare, with Dr. Howard Pendleton, continues studies of the foetal state in labour in relation to maternal hyperventilation.

Dr. J.W. Goodwin has continued basic studies in foetal cardiovascular haemostasis and clinical studies in high-risk pregnancy.

Dr. J.E. Milligan continues studies on physiologic and biochemical factors in nervous system activity of the foetus.

Dr. J.E. Morgan has continued studies in female incontinence and developmental work in gynaecologic endoscopy.

Dr. T.G. Ryley has been carrying out chromosome analyses on infants and adults with congenital abnormalities, intersex problems, leukemia, etc.

Dr. G. Urbach continues studies on the antigenic properties of trophoblast and maternal immunologic responses.

Dr. J.H. Whiteside, with Dr. Maxwell Baldwin, investigated the effects of myo-

metrial activity on the foetus in relation to abnormal labour and epidural anaesthesia.

Dr. Richard Wilson has continued programmes in menopausal replacement therapy and studies on health care delivery to a geographic area in downtown Toronto.

Dr. C.A. Woolever has continued his studies on the mechanism of ovulation control with reference to gonadotrophin function and ovarian steroid genesis.

HONOURS

DR. W.M. PAUL was appointed an Examiner to the Royal College of Obstetricians and Gynaecologists; elected to the Council of the American Gynecological Society; elected President of the Toronto Society of Obstetricians and Gynaecologists.

DR. M.L. BUNKER was elected Vice-President and Director-at-large of the Canadian Cancer Society, Ontario Division.

SCHOLARLY ADDRESSES

DR. W.H. ALLEMANG, "Problems in Respect to Therapeutic Abortion," Muskoka Medical Society, Bracebridge, May 1970.

DR. P.F. BEIRNE, "Ultrasound in Obstetrics and Gynaecology," Annual Meeting, the Royal College of Physicians and Surgeons of Canada, Montreal, January 1970.

DR. RUDI BORTH, "Immunoassay and Bioassay of Gonadotrophins," Combined Meeting of Section of Obstetrics and Gynaecology of the Academy of Medicine and the Toronto Society of Obstetricians and Gynaecologists, Toronto, November 1969; "Kinetics of Radioimmunoassay Systems for Human Luteinizing Hormone," Annual Meeting, Canadian Society for Clinical Investigation, Montreal, January 1970; "Competitive Protein Binding Method for the Estimation of Unconjugated Progesterone, Testosterone, Oestrone, and 178-Oestradiol in Human Placenta," "Theory of Assay Sensitivity in Saturation Analysis," World Health Organization; Second Karolinska Symposium on Research Methods in Reproductive Endocrinology: Steroid Assay by Competitive Protein Binding, Geneva, March 1970.

DR. T.A. DORAN, "Rh Iso-immunization, a Disappearing Problem," Annual Meeting, District v, American College of Obstetricians and Gynecologists (Nurses' Section), Niagara Falls, September 1969; "An Evaluation of Endometrial Lavage," Academy of Laboratory Technologists, Toronto, April 1970; "Tests of Amniotic Fluid for Foetal Maturity," Canadian Gynaecological Fellowship Club, Toronto, April 1970.

DR. D.J. GARE, "The Foetal Effects of Maternal Hyperventilation at Caesarean Section," Annual Meeting, The Society of Obstetricians and Gynaecologists of Canada, Jasper, June 1970.

DR. W.J. HANNAH, "Intrapartum Use of Oxytocin," Staff, Toronto East General Hospital, Toronto, April 1970; "Experience with Sterilization at the Women's College Hospital," Staff, Scarborough Centenary Hospital, Scarborough, May 1970; "Perinatal Intensive Care," Nightingale School of Nursing, Toronto, May 1970.

DR. G. LICKRISH, "The Assessment of Methods of Conception Control," Muskoka Medical Society, Bracebridge, May 1970.

DR. J.E. MILLIGAN, "Chemo-Receptor and Sympathetic Nervous System Activity in the Fetus and its Control of the Circulation," International Symposium on Physiological Biochemistry of the Fetus, Detroit, April 1970; "The Effect of Magnesium Sulphate on Anoxia and Resuscitation in the Newborn," Annual Meeting, The Society of Obstetricians and Gynaecologists of Canada, Jasper, June 1970.

DR. J.E. MORGAN, "Urinary Incontinence," Sixth World Congress of Obstetrics and Gynecology, New York, April 1970; "Laparoscopy - A First Year's Experience," Annual Meeting, the Society of Obstetricians and Gynaecologists of Canada, Jasper, June 1970.

DR. T.G. RYLEY, "Chromosome Research at the Wellesley Hospital, 1963-1969," Combined Meeting of the Section of Obstetrics and Gynaecology of the Academy of Medicine and the Toronto Society of Obstetricians and Gynaecologists, Toronto, February 1970.

DR. G. URBACH, "Foetal/Maternal Immunological Relationships," "Toxaemia of Pregnancy," University of Melbourne, Melbourne, Australia, June 1970.

DR. C.P. VERNON, "Paget's Disease of the Vulva," American Society of Pelvic Surgeons, Augusta, Georgia, November 1969; "Relief of Pain in Labour and Child-birth," Canadian Physiotherapy Association, Toronto, June 1970.

DR. J.H. WHITESIDE, "Some Effects of Estrogen and Progesterone on the Myometrium," Residents and Staff, Forsyth County Hospital, Winston-Salem, North Carolina, January 1970.

DR. R. WILSON, "Birth Control," National Rover Conference (Boy Scouts of Canada), York University, Toronto, August 1969; "A Management Information System for Medical School Administration," Association of American Medical Colleges, Cincinnati, October 1969; "Endocrine Aspects of Infertility," Staff, North York General Hospital, Toronto, November 1969; "The Menopause: Symptomatology and Replacement Therapy," Annual Meeting, the Royal College of Physicians and Surgeons of Canada, Montreal, January 1970; "Health Sciences Educational Planning - The Use of Simulation Models," Conference on Information Systems for Health Science Centers, Stony Brook, April 1970; "The Nursing Profession - Its Attitudes and Organization," 25th Reunion Dinner, Class of 1945, Toronto General Hospital Nurses, Toronto, May 1970; "Problems Relating to Obstetrics and Gynaecology in Communities," Toronto Institute for Pastoral Training, Toronto, June 1970; "Planning for Health Sciences Education - The Relationships between Facilities and Programs," National Seminar on Computer Application in Planning and Design of Health Facilities, Ottawa, June 1970.

DR. C.A. WOOLEVER, "Steroid and Gonadotropic Hormones in Pregnancy and in the Menstrual Cycle," Annual Meeting, Canadian Society for Clinical Investigation, Montreal, January 1970; "Management of Menstrual Excesses," Sixth World Congress of Obstetrics and Gynecology, New York, April 1970.

PUBLICATIONS

BORTH, R. "Parameters for the Characterization of Radioimmunoassay Systems" (*Acta Endocrinologica* supplement 138, 1969, p. 1) (abstract).

——— "Kinetics of Radioimmunoassay Systems for Human Luteinizing Hormone" (*Clinical Research*, vol. 17, 1969, p. 642) (abstract).

BORTH, R. and KIM, M.H. "Human Gonadotrophins: A Review of Recent Developments" (*Canadian Medical Association Journal*, vol. 102, 1970, pp. 1173-8).

GARE, D.J., SHIME, J., PAUL, W.M. and HOSKINS, M. "Oxygen Administration during Labor" (*American Journal of Obstetrics and Gynecology*, vol. 105, 1969, pp. 954-61).

GOODWIN, J. *et al.* "Antepartum Identification of the Foetus at Risk" (*Canadian Medical Association Journal*, vol. 101, 1969, pp. 458-64).

MORGAN, J.E. "A Sling Operation, using Marlex Polypropylene Mesh for Treatment of Recurrent Stress Incontinence" (*American Journal of Obstetrics and Gynecology*, vol. 106, 1970, pp. 369-77).

URBACH, G. "Fetal-Maternal-Placental Immunological Relationships" (*Fertility and Sterility*, vol. 21, 1970, pp. 356-60).

WHITESIDE, J.H. *et al.* "Simulated Intervillous Space Flow in an Acrylic Model" (*Obstetrics and Gynecology*, vol. 34, no. 1, July 1969, pp. 14-21).

WHITESIDE, J.H. and BRAME, R.G. "Uterine Contractility during Altered Vascular Pressure in the Castrated Monkey" (*American Journal of Obstetrics and Gynecology*, vol. 105, 1969, pp. 418-26).

WILSON, R. *et al.* "The Dynamics of Graduate Medical Education" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 1, 1969, pp. 197-211).

OPHTHALMOLOGY

Under the direction of Professor Clement McCulloch

Under the new curriculum, teaching of Ophthalmology has been concentrated into a two-week interval in Period III. Lectures to the whole class are no longer given, but

contact with students is obtained through work in the clinics, on the wards, and as discussions in small groups. This has been found to be a strain on the department, since these learning experiences occur during busy clinics and heavy commitments to service. As the demands for contact with the undergraduates and for service to the patient are concurrent, the staff members have found difficulty in doing justice to the two sides of the situation. It is hoped that the students have gained insight into the problems of the specialty. With one year of the new curriculum behind them, the staff hope to be more effective in the new setting.

To aid the undergraduates, a series of audiovisual tapes were used, and a system of multiple choice examinations extending across the year was developed. Both seemed to be of help.

During the year, students of the Third Medical Year were taught under the old curriculum. This was the last class under that system. The department also assisted in teaching at specific locations in Periods I and II, as required by the Period committees.

The overall experience with the new curriculum has not been happy. However, it is hoped that with a year's experience behind us, the programme will run more smoothly and the learning process for the students be improved.

The graduate programme has continued as the largest academic activity of the department. The first year of the three-year course has continued to be based in the departmental laboratories. The work includes a steady lecture schedule, a home study course, a problem for investigation, and a small commitment to service. The reports by the Fellows of their projects, at the departmental research meeting in the spring, is an opportunity to crystallize thinking and to develop the art of communication. The projects are presented in competition for the John Gaby Prize.

The second and third years are spent in the hospitals, in a programme of ascending responsibility. The service component of the work is heavy, and the men must depend to a great extent on their reading done in the first year. In the final year, at the Annual Clinical Meeting, each man must present a study in competition for the Alumni Prize.

While the graduate programmes are similar over the last few years, the content, scheduling, and organization and general approach to the learning process has been changing rapidly. At present, there is no way to know if the product is getting better, although the quality of ophthalmological services in our province seems to be improving steadily.

The following first-year men were supported through the departmental budget: Dr. F. De Freitas, Dr. J.H. Fowler, Dr. G.J. Johnson, Dr. M.S. Mandelcorn, Dr. J.M. McLean, Dr. W.A. Nash, Dr. D.G. Stewart, Dr. H. Tanzer, and Dr. J.R.C. Todd.

The second-year men rotating through the teaching hospitals have been the following: Drs. D.M. Anderson, T.P. Fejer, D.M. Jamieson, A.L. Maberley, W.G. Macrae, and F. Simon.

The residents in the final year of the programme were: Drs. R. Buncic, W.S. Dixon, M. Easterbrook, G.E.M. Kirker, D.G. Middleton, P. Migasena, S.S. Smith, B.P. Sniderman, and R.D. West.

It should be mentioned that the department is assisting the Hamilton Civic and St. Joseph's Hospital in Hamilton in their ophthalmology teaching programme. Drs. Anne Simpson and A.L. Townsend are in their second year there; and Drs. T.P. Prawak and R.M. Zahoruk are completing their third year and with that their residency training in ophthalmology. With the exception of Dr. Simpson, all three residents have completed their first year of basic ophthalmic science in Toronto.

We welcome Dr. Fred Feldman, who has joined the staff of the department and New Mount Sinai Hospital; and Dr. W.G. Pearce to the staff of the department, Sunnybrook and Sick Children's hospitals. Dr. V. Boniuk has been working as a Graduate Fellow, concentrating on ophthalmic pathology, in the department and at the Toronto General and Sick Children's hospitals. Dr. M. Cooper was a research assistant at the Toronto General Hospital.

Dr. David R. Smith is in Iowa City on a McLaughlin Fellowship, studying problems of squint under Dr. H. Burian.

Dr. Neville Weston, from Trinidad, has been a Graduate Fellow, working with Dr. M. Shea on problems of retinal detachment.

Dr. A.E. Akinosho has come from Nigeria as a Graduate Fellow, and is working in the field of cornea, particularly corneal transplantation.

Dr. D. Rodrigue from Quebec City has been working with Dr. Joseph C. Hill on problems of ophthalmic plastic surgery. He returns to the staff of Laval Medical School.

Congratulations go to Drs. Chubb, Cooper, Faulkner, and Priest, who successfully gained certification in Ophthalmology from the Royal College of Physicians and Surgeons of Canada, and to Dr. D.R. Smith, who achieved Fellowship standing.

The Department held the following meetings during the year: the annual Course in Ophthalmology for Family Physicians was given this year on February 26 and 27, under the direction of Dr. William D. Samis; the first day at the Toronto Western Hospital and the second day at the Hospital for Sick Children. This course has been a continuing success; this year 24 practitioners attended and 25 members of our staff were involved in the teaching. Patients were used continually for demonstrations, and an attempt was made to give exact details of diagnostic procedures and therapeutic management. The 12th Walter Wright Lectureship and a Clinical Convention were held on March 6, 1970. Dr. Irving H. Leopold, Director, Department of Ophthalmology of the Mount Sinai School of Medicine at the City University of New York, gave a paper, "Pharmacological Advances in Ophthalmology." The rest of the day was devoted to papers given by the clinical staff and the Eye Alumni. Grand Ward Rounds were held the following morning at Sunnybrook Hospital.

The annual Clinical Course was held April 2, 3, and 4. It was devoted to Pediatric Ophthalmology and was given at the Hospital for Sick Children under the direction of Dr. J.S. Crawford. These guests of honour assisted: Mr. Kenneth Wybar, Chief of Ophthalmology, Great Ormond Street Hospital for Sick Children, London, England, spoke on "Ocular Manifestations of Brain Stem Lesions in Children" and "Assessment of Suspected Blindness in Infancy"; Dr. Harold Scheie, Professor of Ophthalmology, University of Pennsylvania, spoke on "Congenital Cataracts - Recent Advances in Management" and "Glaucoma Problems in Children"; Dr. Hermann Burian, Professor of Ophthalmology, University of Iowa, spoke on "The Value of Orthoptic Assessment, and Pre- and Post-operative Orthoptic Treatment in Strabismus" and "The Patho-Physiology of Amblyopia." They also took part in several panel discussions. There were 97 registrants from Canada and the United States.

An Ophthalmic Biochemistry Colloquium was held on May 6. This was an original undertaking and was a joint effort between the departments of Biochemistry and Ophthalmology. The guests of honour were Dr. W.K. Noell, Professor of Physiology, State University of New York at Buffalo, who spoke on "Biochemical mechanisms in the action of light upon the retina" and "The basis of clinical electroretinography"; and Dr. Sidney Lerman, Professor of Ophthalmology and Biochemistry, McGill University, who spoke on "Lens proteins in aging and cataract formation" and "The hydrophilic (hydron) corneoscleral lens as a potential therapeutic agent."

This meeting was followed by the Annual Departmental Research Meeting, on May 7. The guest of honour was Dr. Jin H. Kinoshita, Associate Professor of Biochemical Ophthalmology, Howe Laboratory of Ophthalmology, Harvard University Medical School. He spoke on "The role of aldose reductase in the development of galactose cataract." A number of our research staff and the first-year Fellows presented their work. The John Gaby Prize for the best paper by a Fellow was awarded to Dr. H. Tanzer for his paper, "Tonometry and tonography in rabbits."

On May 8 the Annual Departmental Clinical Day was held. The guest of honour was Dr. Albert C. Snell, Professor, Division of Ophthalmology, University of Rochester. He spoke on "Gross and microscopic findings in eye bank eyes." The senior residents presented clinical papers. Dr. N. Easterbrook won the Alumni Prize for his paper, "Ocular findings in severe renal disease." A number of the clinical staff also presented papers. Dr. Akinosho, from Nigeria, presented a paper, "Eye injuries in the Nigerian war."

The departments in the teaching hospitals have continued to expand their clinical

work. In particular, special clinics, where work is confined to limited procedures, are continuing to grow. These include clinics on glaucoma, diabetes, contact lenses, uveitis, and low vision. This type of clinic and the special detailed services offered by the various teaching hospitals are becoming a greater percentage of the total workload.

The Ophthalmic Pathology Laboratory under Dr. W.S. Hunter has continued to be active. Dr. V. Boniuk has assisted greatly; Miss E. Forster has provided the technical help. Two hundred specimens were processed and much work was done to support various research projects. Drs. V. Boniuk, W.S. Hunter, and Clement McCulloch attended the Canadian Ophthalmic Pathology Study Club meeting in Quebec City in January of this year and presented material.

The department wishes to thank the many contributors who have supported our work this year, either through support of staff or purchase of equipment.

Mrs. H.B. Stapells and her family assisted three Fellows this year: Dr. John A. Parker, Dr. Vivien Boniuk, and Dr. Neville Weston.

The Selkirk Fund has continued to be a source of support to the department, particularly for the residents. The Alumni have given valuable aid to the residents.

The Geriatrics Foundation has given valuable support in studies by Dr. Hausler of the aging of ocular blood vessels.

Through the generosity of Mrs. Lillian Kerbel and the Manny B. Kerbel Fund we have been able to buy equipment to start a contact lens clinic in the Toronto General Hospital.

The Independent Order of Odd Fellows have continued to support Dr. Matuk and his research work during the year. In addition, the boys of Mohawk Junior Lodge of Belleville have contributed towards the purchase of valuable equipment. On May 5 the boys visited our laboratories.

The Rebekah Assembly of the IOOF have contributed several items of equipment for our laboratories.

We are grateful for a bequest from the Lillian Mary Black estate for research in ophthalmology.

There have been many smaller contributions to the department during the year, for which we are grateful.

Dr. Wendell Hughes, from New York, visited in September and gave a series of lectures to the residents.

Dr. S. Richter, from the Humboldt University in East Berlin, visited in January and gave a lecture.

Dr. J. Agarwal, from Madras, visited the Department in April.

Dr. Henry Wyatt from St. Paul's Eye Hospital, Liverpool, visited in March and gave a talk, "A mechanical analysis of glaucoma."

Dr. G. Lugossy, from Budapest, gave a talk on uveitis in April.

Dr. E.S. Perkins, Professor of Experimental Ophthalmology at the Institute of Ophthalmology in London, England, visited and gave a lecture in May.

RESEARCH

Under a Medical Research Council Grant entitled "Immunological studies on the cornea," Dr. P.K. Basu, with the assistance of Mrs. I. Fielding and Mr. F. Carré, continued studies on the immunological problems related to corneal grafting using different kinds of *in vivo* and *in vitro* models. Dr. J.H. Fowler and Dr. Basu finished a project on the cytology of the anterior chamber fluid in corneal xenograft reaction in rabbits. Dr. G.J. Johnson and Dr. Basu made a comparative study on penetrating keratoplasty in rodents.

With the assistance of a National Health Grant entitled "Artificial cornea" and a Medical Research Council Grant "Keratoprosthesis," Dr. B. Zucker, with Mr. F. Sanger, has continued to develop the artificial cornea and, assisted by Mr. W.A. Becker, is studying the changes of corneal astigmatism following cataract incision.

Mrs. A. Wolf is continuing her work as executive secretary of the Eye Bank of

Canada (Ontario Division). Since the beginning of the Eye Bank programme in 1955, 4,383 eyes have been donated and 2,229 eyes have been used for corneal transplantation. The total number of people who have signed donor cards pledging their eyes is now 50,000. The Eye Bank is a joint programme with the Canadian National Institute for the Blind and is under the direction of Dr. G.A. Thompson. Recently the Eye Bank took on the additional task of preparing cadaveric suture material for ocular plastic surgery and setons for glaucoma surgery.

With the support of a Medical Research Council grant entitled "Biosynthesis of proteins in the retina," Dr. Y. Matuk, assisted by Mrs. T. Nguyen-tan, has continued the study of protein synthesis in cell-free systems obtained from beef retina. They found that the retina contains very heavy polyribosomal fractions with very few monosomes. Ribosomal subunits appear to be present in moderate amounts. They studied also the effects of Mg^{++} , K^{+} , and phosphocreatine on protein synthesis.

Under a National Health Grant, "Clinical investigation of ideopathic retinal detachment," Dr. M. Shea, assisted by Dr. N. Weston and Dr. W. S. Dixon, has continued his work on the transvitreal electrocoagulation of rabbit fundal vessels and the development of methods for cryofixation. Under the same grant, Drs. C.B. Mortimer and M.J. McLean are evaluating diabetic retinopathy with fluorescein fundus angiography. With Dr. W.M. Easterbrook, Dr. Mortimer is also studying the ocular findings in severe renal disease. With the help of Dr. W.A. Nash, Dr. L.D.J. Chisholm has been studying the effect of fibrinolytic agents on simulated vitreous hemorrhage in rabbit eyes.

With the aid of a National Health Grant, "Prevention of blindness from glaucoma," Drs. R.K. MacDonald and H. Tanzer have developed a technique of performing tonometry and tonography in rabbits. Dr. MacDonald is also preparing setons for use in glaucoma surgery. Under this grant, Dr. J.S. Speakman and Dr. J.R.C. Todd have completed a study on the mydriasis of acute angle closure glaucoma. Dr. Speakman and Dr. M. Ghosh are doing an electron microscopic investigation of the lens in patients with exfoliation of the capsule. Drs. J.D. Morin and F. de Freitas are studying the effect of intraocular hypertension on the blood supply of the optic papillae.

Assisted by a National Health Grant entitled "Diabetic retinopathy, its prevention and treatment," Dr. H.R. Hausler, with the aid of Drs. T.M. Sibay, M. Ghosh, G.E.M. Kirker, D.G. Stewart, and Miss B. Stachowska, has continued his studies towards a better understanding of the basic pathology of diabetic retinopathy and towards a search for better means of treatment and prevention. The research involved animal experiments at the laboratories at 1 Spadina Crescent, and clinical double-blind studies which were carried out at the Toronto Western Hospital. Dr. Hausler and Dr. Basu, with the assistance of Dr. Ghosh, are also conducting research on the changes in ocular blood vessels due to aging. This research has been supported by a grant from the Medical Research Council and financial assistance from the Ontario Geriatric Research Society.

With the assistance of Dr. M.A. Waheed, and with the financial help of a National Health Grant entitled "Effects of environmental pollution on the eye," Dr. Basu has completed a study on the effect of air pollutants on the ocular tissues.

Dr. J.A. Parker is continuing his investigation of stereopsis in a noisy background, aided by a grant from the Defence Research Board. He is also evaluating the non-homogenous and aspheric properties of the crystalline lens with a Medical Research Council grant entitled "Analysis of the aspheric surfaces of the human lens."

A number of research projects have also been undertaken by the clinical staff of the department related to their particular field of interest. Dr. L. Lloyd is continuing her research into the problems of neuro-ophthalmology at the eye clinics of the Hospital for Sick Children and the Toronto General Hospital. Dr. G.A. Thompson, Dr. Basu, and Dr. Subramanian, a Colombo Plan Fellow from India, have completed a study on the cellular response of the conjunctiva following keratoplasty and cataract extraction. Dr. Thompson and Dr. P. Migasena are also investigating the problems of lattice degeneration of the cornea. Drs. J.D. Morin and J.R. Buncic are using after-image

scotometry in assessing macular formation. Drs. S.S. Smith, W.G. Macrae, and W.S. Hunter are studying phacolytic glaucoma. Drs. H.R. Sniderman and B.P. Sniderman are making observations on non-ocular aspects of patients undergoing cataract surgery. Dr. G.E.M. Kirker has made a study of peripheral retinal degeneration in high myopia, with the assistance of Dr. D.J. McDonald. Dr. R.D. West is doing research into the use of Valium for eye surgery anaesthesia. Dr. F. Feldman is studying the condition of the blood vessels in glaucoma and Dr. N. Weston is analysing the results of scleral buckling procedures. Dr. R.M. Zahoruk is studying the disc-macular relationship in vertical muscle paresis, and Dr. T. Prawak contributed to a glaucoma survey which took place in Hamilton. Dr. W.S. Hunter and Dr. V. Boniuk are studying postmortem specimens in paediatric deaths and also assisting the Eye Bank in doing a pathological study on the removed host corneal buttons.

Dr. J.S. Crawford, with the help of Dr. N. Mandelcorn, is continuing studies on cadaveric suture materials prepared from human fascia lata. He is also investigating the end results of lamellar cataracts. The purpose of this project is to determine what results are obtained after optical iridectomy, lens extraction, and in some cases where no treatment at all is carried out. Dr. J.C. Hill is continuing a comparative study on the condition of the orbicularis muscle in health and disease in different age groups, using light and electron microscopy. He is being assisted in this project by Drs. D. Rodrigue and M. Ghosh. Dr. M.J. Arstikaitis is continuing her studies on the eyes of premature babies who are receiving oxygen therapy.

Dr. W.G. Pearce is in the process of establishing an Ocular Genetics Clinic at the Hospital for Sick Children to which patients with genetic ocular disease are referred from Toronto and other parts of Ontario. Not all patients referred require extensive investigation, the majority being referred because of the desire of the patients or relatives for genetic counselling. However, two families, one with Cockayne's syndrome and one with congenital blepharophimosis, are being investigated and it is hoped that some useful information will emerge from the study of these two families. Under Dr. Pearce's direction, a project to investigate the importance of the hereditary factors in the production of accommodative and partially accommodative esotropia has also been established in the Hospital for Sick Children.

At St. Joseph's Hospital, Dr. M. Shusterman has initiated retinal fluorescence angiography, with particular reference to diabetic retinopathy and its treatment with laser photocoagulation. Dr. Shusterman is also conducting studies of interesting cases of retinal and vitreal pathology, as well as cases of catgut allergy and intracameral plastic lenses.

HONOURS

DR. CLEMENT McCULLOCH is Editor of the *Transactions of the American Ophthalmological Society* and a member of the executive of that Society.

DR. R.G.C. KELLY is President of the Canadian Ophthalmological Society and on the Executive of the Pan American Association of Ophthalmology. He is President of the International Regional Congress of Ophthalmology held at Yellowknife, N.W.T.

DR. G.A. THOMPSON is Medical Director, Eye Bank of Canada (Ontario Division), and a National Consultant Ophthalmologist for the Canadian National Institute for the Blind.

SCHOLARLY ADDRESSES

DR. CLEMENT McCULLOCH, "Keratoconus," Canadian Ophthalmological Pathology Study Club, Quebec City; "Traumatic Surgery of the Cornea," Ophthalmic Micro-surgery Study Group, Merida, Yucatan; "Principles of Ophthalmic Micro-surgery," Ophthalmic Micro-surgery Course, Eye and Ear Hospital, School of Medicine, University of Pittsburgh, Pittsburgh.

DR. L.D.J. CHISHOLM, "Diseases of the Retina," Ophthalmology for Family

Physicians Course, Toronto; "Pediatric Retinal Detachments," Walter Wright Lectureship and Clinical Convention, Toronto.

DR. J.S. CRAWFORD, "Congenital Fibrosis Syndrome," Canadian Ophthalmological Society Meeting, Victoria.

DR. JOSEPH C. HILL, "Congenital Anomalies," American Academy of Ophthalmology and Otolaryngology meeting, October 12-16, 1969.

DR. W.S. HUNTER, "Reis-Buckler Corneal Dystrophy," the first Pan American Ophthalmic Pathology Society Meeting, Mexico City; "Norrie's Disease," Verhoeff Society Annual Meeting, Washington, D.C., April 1970.

DR. LOIS A. LLOYD, "Common Fundus Lesions," Ophthalmology for Family Physicians Course, University of Toronto, February 1970.

DR. J.A. PARKER, "Distortion in Fundus Charting," Academy of Medicine, Section of Ophthalmology, Toronto.

DR. W.G. PEARCE, "Ocular Features of Tuberous Sclerosis," Section of Ophthalmology, Academy of Medicine, Toronto, December 1969; "Genetic Counselling in Hereditary Ocular Disease," Pediatric Ophthalmology Course, Hospital for Sick Children, April 1970; "The Corneal Scleral Wound in Cataract Extraction," Annual Clinical Day, Department of Ophthalmology, University of Toronto, May 1970.

DR. MICHAEL SHEA, "Cryosurgery of Vitreous and Retina," Enfant Jesus Hospital, Quebec City, October 1969; "Ocular Effects of Malnutrition," Department of Public Health, School of Hygiene, November 1969; "Diabetic Retinopathy," Ophthalmology for Family Physicians Course, Toronto Western Hospital, February 1970; Cryofixation and Surgery of the Vitreous," Irish Ophthalmological Society Meeting, April 1970; "Present Status of Cryosurgery in Retinal Detachment," the Forty-Third Annual Clinical Conference of the New York Eye and Ear Infirmary, New York, May 1970; "Cryofixation," Annual Meeting of the Massachusetts Eye and Ear Infirmary Alumni Association, May 1970.

DR. M. SHUSTERMAN, "Pediatric Retinal Pathologic Conditions," Ophthalmology for Family Physicians Course, Hospital for Sick Children, February 1970; "Diabetic Retinopathy," St. Joseph's Hospital Clinical Society meeting, May 1970.

DR. BERNARD SLATT, "Papilledema," Branson General Hospital, December 1969; "Light Induced Nystagmus," Canadian Ophthalmological Society Meeting, Victoria, June 1970.

DR. HAROLD R. SNIDERMAN, "Cataract," Ophthalmology for Family Physicians Course, Toronto Western Hospital, February 1970.

DR. JOHN S. SPEAKMAN, "Epithelial Downgrowth," Academy of Medicine, Section of Ophthalmology, April 1970; "Pupil Block in Aphakia," Canadian Ophthalmological Society Meeting, Victoria, June 1970.

DR. P.K. BASU, "Ocular Cryotherapy and Autoimmunity," XXL International Congress of Ophthalmology, Mexico City, March 1970; "Corneal Graft Reaction," Immunology Seminar, University of Toronto, February 26, 1970.

DR. Y. MATUK, "The Metabolism of Vitamin A," Ophthalmic Biochemistry Colloquium, University of Toronto, May 1970.

PUBLICATIONS

ALLIN, W.D., MILLER, J.R. and MATUK, Y. "Some Properties of an Adenosine Triphosphatase obtained from Beef Corneal Epithelium" (*Canadian Journal of Physiology and Pharmacology*, vol. 48, 1970, pp. 176-81).

ARSTIKAITIS, MARIA. "A Case of Bilateral Microphthalmos with Cysts" (*Archives of Ophthalmology*, vol. 82, 1969, pp. 480-2).

BASU, P.K., CARRÉ, F. and FIELDING, I. "Corneal Graft Reaction and Emperipolesis" (*Indian Journal of Ocular Pathology*, vol. 3, 1969, pp. 1-7).

BASU, P.K. and LUSIS, G. "The Effect of Hypothermia on Frog's Cellular and Vascular Response to Heterotopic Corneal Xenografts" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 184-6).

CHISHOLM, L. "Ocular Injury due to Blunt Trauma" (*Applied Therapeutics*, vol. 11, 1969, pp. 601-6).

CHUBB, P.D. and MACDONALD, R.K. "The Measurement of Ocular Rigidity" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 272-82).

- CRAWFORD, J.S. (with Morgan, A.L.) "The Eyes and Lids"; in *Paediatric Surgery*, ed. C.D. Benson, *et al.* pp. 133-53. Chicago: Year Book Medical Publishers, 1970.
- CRAWFORD, J.S. "Nature of Fascia Lata and its Fate After Implantation" (*American Journal of Ophthalmology*, vol. 67, 1969, pp. 900-7).
- EASTERBROOK, M., HILL, J.C. and TUFFNELL, P.G. "Bacterial Decontamination of Polymethyl Methacrylate in Ophthalmology" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 247-57).
- FELDMAN, F. (with Sweeney, V.P. and Drance, S.M.) "Cerebro-Vascular Studies in Chronic Simple Glaucoma" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 358-64).
- GHOSH, M., HAUSLER, H.R., BASU, P.K. and STACHOWSKA, B. "An Electron Microscopic Study of Retinal Capillaries of Normal and Spontaneously Diabetic Chinese Hamsters" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 187-93).
- HUNTER, W.S. "Laceration of the Eyelids" (*Applied Therapeutics*, vol. 11, 1969, pp. 595-6).
- HUNTER, W.S. (with Blodi, F.C.) "Norrie's Disease in North America" (*Documenta Ophthalmologica*, vol. 26, 1969, pp. 434-50).
- KIRKER, G.E.M. and HAUSLER, H.R. "Effects of Hypoxia on the Retinal Vasculature of the Alloxan-Diabetic Mouse" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 169-74).
- MABERLEY, A.L., HILL, J.C. and TUFFNELL, P.G. "Contamination of Trial Contact Lenses" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 46-54).
- MABERLEY, A.L. and CHISHOLM, L.D.J. "The Effects of a Fibrinolytic Agent on Vitreous Hemorrhage in Rabbits" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 55-64).
- MACRAE, W.G. and BASU, P.K. (with Willinsky, M.D.) "Corneal Injury caused by Aerosol Irritant Projectors" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 3-11).
- MATUK, Y., MANERY, J.F. and DRYDEN, E.E. "The Effects of Anoxia, Glucose, ATP, and Ouabain on Na, K and Cl in the Rabbit Lens" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, no. 10, 1969, pp. 853-61).
- MCCULLOCH, C. "Choroideremia: a clinical and pathologic review" (*Transactions of the American Ophthalmological Society*, vol. 67, 1969, pp. 142-95).
- "Filtration with Seton - an operative procedure" (*Advances in Ophthalmology*, vol. 22, 1970, pp. 179-82).
- MIDDLETON, D.G. and MCCULLOCH, C. "An Enquiry into Characteristics of Sutures, Particularly Fine Sutures" (*Advances in Ophthalmology*, vol. 22, 1970, pp. 35-48).
- PARKER, J.A. (with Kintz, R.T. and Boynton, R.M.) "Information in Transmission in Spectral Color Naming" (*Perception & Psychophysics*, vol. 5, 1969, pp. 241-5).
- PARKER, J.A. "Guidelines in low vision prescriptions" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 382-3).
- SHEA, M. (with Schirmer, K.) "Erecting Prism Attachment for Indirect Ophthalmoscopes" (*Archives of Ophthalmology*, vol. 83, 1970, pp. 529-32).
- SHEA, M., SMITH, D.R., RAFUSE, E.V. and SOMERVILLE, G.M. "Cryofixation with Vitreous Excision. A Suggestion for the management of some cases of traumatic retinal detachment" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 339-45).
- SLATT, B.J. "Burns to the Eye" (*Applied Therapeutics*, vol. 11, 1969, pp. 601-6).
- SMITH, S.S. and BASU, P.K. "Mast Cells in Corneal Immune Reaction" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 175-83).
- STEIN, H.A. "Foreign Body Injuries to the Eye" (*Applied Therapeutics*, vol. 11, 1969, pp. 591-3).
- SUBRAMANIAN, K., BASU, P.K. and THOMPSON, G.A. "Postoperative Tear Cytology" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 65-7).
- SUBRAMANIAN, K. and BASU, P.K. "The Contribution of the Host and Graft Cells in the Healing of Corneal Transplants - An autoradiographic study" (*Canadian Journal of Ophthalmology*, vol. 5, 1970, pp. 194-7).
- TOWNSEND, A.L. and CRAWFORD, J.S. "Stored Fascia Lata for Ophthalmic Surgery" (*Canadian Journal of Ophthalmology*, vol. 4, 1969, pp. 331-8).

OTOLARYNGOLOGY

Under the direction of Professor D.P. Bryce

The activities of the Department of Otolaryngology have continued during the past year in the direction established by the policy of the past two or three years.

There has been an increasing activity in the new undergraduate curriculum. The department continues to train 32 residents, our University quota. The research activity of the department continues to increase with the development of two new laboratories in the Banting Institute and one in the Medical Sciences Building.

A Temporal Bone Bank has been established with the assistance of the Department of Health of Ontario. A great deal of effort has gone into the publicity of this activity and displays have been presented at the Canadian Otolaryngological Society and the Canadian Medical Association.

The American Board of Otolaryngology held its examinations in Toronto in May 1970 and 93 candidates from all parts of North America were examined. A successful and very interesting course in Paediatric Broncho-Esophagology was held at the Hospital for Sick Children in February. The first research conference in Otolaryngology was organized and held in Montreal in February. Representation was made by almost all the Canadian schools with a research programme in this field. This conference was supported in part by the MRC of Canada and most of the projects being carried out in Toronto were presented. It is hoped that this conference will become a biannual affair.

Dr. V.G. Lawson and Dr. J. Friedberg joined the department during the course of the year after studying respectively in Los Angeles and Oxford. Both are recent graduates of our postgraduate course. Dr. Derek Birt joined the department at Sunnybrook Hospital from Middlesex Hospital in London where he obtained his training in Otolaryngology. Dr. Joseph McClure, an MRC Fellow in the department previously, joined the Faculty at St. Michael's Hospital with a major interest in clinical research.

Members of the Department of Otolaryngology took part in many international meetings during the course of the year, both in this country and in Europe.

VISITORS

Mrs. Caroline M. Sim, Consultant, ENT Surgeon, King's College Hospital, London, England; Dr. Georg Von Bekesy, Laboratory of Sensory Sciences, University of Hawaii, Hawaii; Dr. D. Garfield Davies, Consultant Otolaryngologist, Middlesex Hospital, London, England; Dr. R.P. Gannon, MRC Visiting Professor, Institute of Otolaryngology, Royal Victoria Hospital, Montreal, Quebec; Dr. Gunnar Ashan, Department of Oto-rhino-laryngology, Regional and University Hospital, Sweden; Dr. Von Ilberg, Department of Otolaryngology, University of Frankfurt, Frankfurt a.M., Germany.

RESEARCH

The rapid expansion of research activity in all aspects of Otolaryngology has continued to such an extent that, by the end of the academic year, 40 projects were in varying stages of development. This progress has been made possible by the addition to our staff from various parts of the world (England, Hong Kong, United States, Czechoslovakia, India, West Germany, Scotland, etc.) together with recent graduates from various Canadian universities.

This expansion has been facilitated by the allocation of more University laboratory space in the Medical Sciences Building and the Banting Institute. Considerable additional financial assistance has been obtained during the past year.

Various granting agencies included the Atkinson Foundation of Toronto, Defence Research Board, Charlie Conacher Research Fund, Carey E. Fox Foundation, Ontario Department of Health, Ontario Cancer Treatment and Research Foundation, John F. Hartford Foundation, Medical Research Council, Deafness Research Foundation of New York, and the Sunnybrook Hospital Research Fund.

HONOURS

T.D.R. BRIANT, Canadian Medical Association, Audio Visual Award, 1st in 16 mm. film category for film entitled "Trans Sphenoidal Hypophysectomy."

B. FEARON, elected member of the Board of the Chevalier Jackson Foundation for research in laryngology; elected Thesis Committee Chairman, American Broncho-Esophagological Association 1969-70.

SCHOLARLY ADDRESSES

P.W.R.M. ALBERTI, "Clinical Application of Impedance Audiometry: A Preliminary Appraisal of an Electro-Acoustic Impedance Bridge," Eastern Section, American Triological Society, Boston, January 8, 1970; "Audio Visual Aids in Otolaryngology," the Society of University Otolaryngologists, Portland, Oregon, March 1970; "New Tools for Old Tricks, American Otological Society, Inc., Hollywood Beach, Florida, April 1970; "Magic Lantern 1970 Style," Council of Medical Television Annual Meeting, Philadelphia, Pa., April 1970; "Use of Tape-Slides in Medical Teaching," guest of the Faculty of Medicine, University of Alberta, Medical School, Edmonton, Alberta; "Modern Teaching Methods," Albert Einstein School of Medicine of Yeshiva University, Division of Otolaryngology, May 1970; "Unilateral Exophthalmos," Albert Einstein School of Medicine of Yeshiva University, Division of Otolaryngology, May 1970, and Upstate Medical Center, State University of New York, Syracuse, June 1970.

H.O. BARBER, "History of Dizziness – Motion Picture entitled 'Dizziness,'" Foothills Hospital, General Practitioners Refresher Course, Calgary, Alberta, Oct. 1969; "Postural Dizziness and Positional Nystagmus," American Academy of Ophthalmology and Otolaryngology, Chicago, Ill., October 1969; "Dizziness" (Film), Annual meeting of American Speech & Hearing Association, Chicago, Ill., November 1969; "Clinical Application of Electronystagmography," New England Otolaryngological Society, Harvard University, Boston, Mass., November 1969; "An Otoneurological Unit," Graduate training programme – Neurologists, Family Physicians, Queen's University, Kingston, Ontario, December 1969; "Positional Nystagmus, Electronystagmography" and film "Dizziness," Graduate physicians & residents. Visiting Professor programme, Laval University, Quebec City, Feb. 1970; "Chronic Otitis Media, Panel on Vasomotor Rhinitis," Graduate Training programme, Family practitioners, University of Toronto Sunnybrook Hospital, Feb. 1970; "Dizziness," a film, American Association of Neurological Surgeons. Washington, D.C., April 1970; "Vestibular Tonus – Clinical Application," Canadian Otolaryngological Society, Halifax, N.S., June 1970.

R.B. BRADSHAW, "Microvascular Anastomosis," Oxford University, Great Britain, May 1970.

T.D.R. BRIANT, "Hypophysectomy," University of Laval, Faculty of Medicine, June 1970; "Angiofibroma," Le Centre Hospitalier, Quebec, P.Q., June 1970; "First Annual Dr. Glen H. Leak Teaching Day," Buffalo General Hospital, State University of New York, January 1970; "Hypophysectomy," Pittsburgh Academy of Otolaryngology, Chicago, October 1969.

M.L. BROSNAN, "Use of Paraffin in the Middle Ear," OMA Section of Otolaryngology, Ottawa, May 1970.

J.S. CHAPNIK, "The Day Ear Hook – A Useful Instrument in Office Otology," Otolaryngology Section of OMA, May 1970.

D.P. BRYCE, "Treatment in Tumours of the Larynx," American College of Surgeons, Washington, D.C., Sectional Meeting, March 1970; "Fibrosarcoma of the Larynx," American Academy of Ophthalmology and Otolaryngology, Chicago, Ill., October 1969; "Carcinoma of the Larynx – Histopathological Study of Irradiated Cases," Presented at the 12th Annual Meeting of the American Society for Head and Neck Surgery, Hollywood, Fla., April 1970; "Treatment of Advanced Carcinoma of the Larynx," American College of Surgeons, October 1969, and Midwinter Seminar in Otolaryngology, Hollywood Beach, Florida, January 1970.

W.S. CRYSDALE, "Effect of Ultrasound on the Cochlea," 7th Workshop on Inner Ear Biology, Stockholm, Sweden, June 1970.

V.S. DAYAL, "Comparative Study of Functional and Radical Neck Dissections," International Congress of Otolaryngology, Mexico City, August 1969; "Pre-epiglottic Space, an Anatomical Study," Annual meeting Canadian Otolaryngological Society June 1970; "Functional and Radical Neck Dissections," Inter-University Research Seminar, Montreal, February 1970; "Opto-Kinetic Nystagmus," Inter-University Research Seminar, February 1970.

J. FARKASHIDY, "Clinical Significance of Spontaneous Vertical Nystagmus," Inter-University Research Seminar, Montreal, February 1970.

B. FEARON, "Treatment of Benign Stenosis of the Esophagus with Cortisone Injection," American Broncho-Esophagological Association, Hollywood Beach, Fla., April 1970.

W.H. JOHNSON, "Panel Discussion of ENG in Relation to Peripheral *vs.* Central Pathology," Canadian Otolaryngological Study Group, Montreal, June 1970; "Medical Problems in Space Flight," Ontario Society of Medical Technologists, March 1970; "Caloric Stimulation," Canadian Otolaryngological Study Group, June 1970; "Condition of Tests and Arousal," Canadian Otolaryngological Study Group, Montreal, June 1970.

PUBLICATIONS

ALBERTI, P.W.R.M. "Audio-Visual Aids in the Teaching of Otolaryngology" (*Laryngoscope*, vol. 79, Aug. 1969, pp. 1428-42).

——— Review, *Canadian Journal of Surgery*, vol. 12, Oct. 1969, p. 502.

ALBERTI, P.W.R.M. *et al.* "Clinical Application of Impedance Audiometry: A Preliminary Appraisal of an Electro-Acoustic Impedance Bridge" (*Laryngoscope*, vol. 80, May 1970, pp. 735-46).

BARBER, H.O. "Psychosomatic Disorders of the Ear, Nose and Throat" (*Postgraduate Medicine*, May 1970, pp. 156-9).

BARBER, H.O. and SMITH, D.M. "Are Caloric Tests Necessary?" (*Annals of Otology, Rhinology and Laryngology*, vol. 78, Oct. 1969, p. 950).

FEARON, B. "Anaesthesia in Paediatric Peroral Endoscopy" (*Annals of Otology, Rhinology and Laryngology*, vol. 78, June 1970, pp. 469-75).

PAEDIATRICS

Under the direction of Professor H.W. Bain

The Department of Paediatrics of the University of Toronto and the Hospital for Sick Children established a new Division of Community Health under the direction of Dr. Ursula Anderson. After considerable research, the division is now prepared to open two or three community clinics in sections of Toronto where the standard of health care is well below average.

The Sioux Lookout Project, delivery of health care to Indians in North-Western Ontario, completed its first year of operation and over fifty doctors, dentists, residents, and medical students spent voluntary periods of one week to one month working in the area.

A one-month elective period for postgraduate residents in Paediatrics was established at the Ontario Crippled Children's Centre, providing specialized instruction in rehabilitation medicine.

In collaboration with the Department of Psychiatry of the Hospital for Sick Children (Dr. Saul Levine), the Out-Patient Division, under the direction of Dr. Donald Stewart established a clinic for the treatment of acute psychiatric problems without the usual prolonged waiting period.

The departments of Paediatrics and Psychiatry are also collaborating in a programme to deal with the drug abuse problem in children and adolescents.

Dr. Gerald Arbus joined the full-time staff of the Division of Nephrology on January 1, 1970, after postgraduate work in Boston and New York. He is responsible for the supervision of the Dialysis Unit and for the medical aspects of the dialysis-transportation programme.

Dr. J.W. Balfe joined the full-time staff of the Division of Nephrology on January 1, 1970, following postgraduate work in North Carolina and New York.

Dr. T. Baliah resigned from the staff on January 31, 1970, to assume a similar post on the staff of the Children's Hospital, Buffalo, New York.

In collaboration with the Department of Surgery, the chronic dialysis programme for treatment of end stage renal failure has expanded and during the past year five children have received kidney transplants.

Dr. Graham W. Chance, Senior Lecturer, University of Birmingham, England, joined the full-time staff in the Division of Neonatology. His special interest is in metabolic disorders of the newborn.

Dr. A.C. Bryan joined the Division of Respiratory Physiology. His primary appointment is Associate Professor, Department of Anaesthesia.

Dr. Patrick Wei joined the full-time staff in the Division of Gastroenterology.

Dr. William Davidson, Dr. Marvin Gans, Dr. Michael Lester, Dr. Frank Mellows, Dr. C.L. Rodgers, Dr. Donald Shepley, and Dr. Pryma Skowron joined the staff in the Division of General Paediatrics.

Dr. Delbert Hoare retires from the active staff at the completion of this academic session. Dr. Hoare has served for many years in both General Paediatrics and as a member of the staff of the Diabetic Clinic.

Dr. Helen Reid and Dr. Ross Matthews joined the Staff of Paediatrics.

The department was saddened by the deaths of Professor Andrew Hunter of the Department of Biochemistry and Dr. Stewart Rogers, Chief of our Division of Paediatric Dermatology.

The following visited the Department of Paediatrics during 1969-70: Dr. Hermien E. Zoethout and Miss Van de Stadt, Sophia Children's Hospital, Rotterdam, The Netherlands; Dr. J.S. Robinson, Sevenoaks Hospital, Kent, England; Dr. H.C. Dyer, Medical Officer, Health Service, University of the West Indies; Dr. Allan Drash, Director, Clinical Study Center, Children's Hospital, Pittsburgh, Pa.; Dr. William McCoy, Medical Administrator, Children's Hospital, Adelaide, Australia; Dr. John Tanner, Professor of Child Health & Growth, London, England; Dr. Richard Talamo, Assistant Professor of Paediatrics, Massachusetts General Hospital, Boston, Mass.; Dr. Henry Nadler, Children's Memorial Hospital, Chicago, Ill.; Dr. Samuel L. Katz, Professor and Chairman, Dept. of Pediatrics, Duke University Medical Center, Durham, N.C.; Dr. James W. Sayer, Director, In-Patient Services, University of Rochester School of Medicine, Rochester, N.Y.; Dr. Robert Good, American Legion Memorial Research Professor, Variety Club Heart Hospital, Minneapolis, Minn.; Dr. W. Hugh Missildine, Director, Children's Mental Health Center, Columbus, Ohio; Dr. David Lawson, Administrator, Queen Mary's Hospital for Children, Carshalton, Surrey, England; Dr. Geoffrey S. Dawes, Director, Nuffield Institute for Medical Research, Oxford, England; Dr. Robert E. Cooke, Johns Hopkins Hospital, Baltimore, Maryland; Dr. James E. Breheny, Medical Director, Mercy Maternity Hospital, Melbourne, Australia; Dr. John Court, Director, Diabetic Clinic, Royal Children's Hospital, Melbourne, Australia.

RESEARCH

Adolescent Medicine (Dr. Martin Wolfish, Director)

With the increase in our hospital patient age limit to 19 years and with the increasing problems of drug abuse amongst adolescents, there has been a marked increase in the activity of this clinic. Research into the cause and management of obesity continues. A committee for the study of prevention and treatment of drug abuse has been established and plans are underway for the establishment of an adolescent in-patient unit.

Allergy (Dr. C. Collins-Williams, Director)

(a) The research programme on disodium cromoglycate (Intal) in the treatment of asthma has been concluded; (b) the research project on provocative bronchial testing and provocative nasal testing continues; (c) the study of immunoglobulin iga in the secretions of the respiratory tract of children continues; (d) during 1969-70, three Fellows continued in the training programme.

Cardiology (Dr. J.D. Keith, Director)

During 1969, the Division of Cardiology presented an international symposium on the Natural History of Congenital Heart Disease. This was organized over a two-year period and was attended by almost 400 physicians from Canada and the United States. The presentations will be published in book form during the next few months.

Dr. R. Fowler continued his studies with Professor O'Beirne on vectorcardiograms and scalarcardiograms in relation to clinical findings.

Dr. B.S.L. Kidd continued his studies on blood flow in humans and in anaesthetized dogs. The right ventricular outflow tract was shown to react in certain types of Tetralogy of Fallot and Ventricular Septal Defect when specific drugs are used. Dr. Peter Olley conducted a detailed follow-up study of the cases of Tetralogy of Fallot corrected surgically by a banding operation. Mortality has come down significantly and the long-term follow-up results appear good.

Chest (Dr. J.A.P. Turner, Director)

During the year, the Division of Chest Diseases was re-organized. Dr. J.A. Peter Turner, Division Chief, concentrated on clinical pulmonary problems and clinical research. Dr. Henry Levison assumed the responsibility for basic pulmonary research, and Dr. Douglas Crozier directed the activities of the cystic fibrosis clinic on a major part-time basis.

Dr. Turner is completing a study on the hyperlucent lung in childhood. Dr. Robert Sutton, Fellow, is compiling data on our experience with hydrocarbon pneumonitis and a prospective study of the long-term effects of this condition in infants and children is underway.

Dr. Crozier has continued the clinical assessment of therapeutic regimens in cystic fibrosis. Included is a study of carbenicillin in the treatment of drug-resistant pulmonary infections. Dr. Duic, Fellow, and Dr. Crozier are investigating the incidence of diabetes mellitus in patients suffering from cystic fibrosis. Dr. Levison's projects are as follows: (a) a continuing study of lung volume, mechanics of ventilation, and arterial blood gases in asthma – obtaining objective criteria for therapy, obtaining a better understanding of the pulmonary changes in bronchial asthma and obtaining criteria for the distinction between reversible and irreversible pulmonary changes; (b) in collaboration with Dr. A.C. Bryan, Director of Research in Anaesthesia at the Toronto General Hospital and Dr. L.D. Wood of the Canadian Forces Institute of Environmental Medicine – a study of the physiological effects of breathing dense gases on healthy subjects and children with asthma, in the hope of improving our understanding of gas exchange; (c) a pre- and post-operative study of changes in the lungs of children with scoliosis, in collaboration with Dr. John Hall of the Orthopaedic Service; (d) a study of regional ventilation and perfusion lung volume – mechanics of ventilation in children with cystic fibrosis. In addition, there is a study of the mist tent in cystic fibrosis, in an attempt to learn where water droplets are deposited in the respiratory tract, using radioactive isotopes.

Community Medicine (Dr. Ursula Anderson, Director)

Dr. Anderson has compiled statistics on morbidity and mortality, birth rate, etc. on various census tracts in Metropolitan Toronto. Results indicated that there are several areas in Toronto where the overall level of health is far below the average. Community clinics are to be started in two or three of these areas with a view to determining the cause for this state of affairs and providing a better method of delivery of health care.

Endocrinology (Dr. J.D. Bailey, Director)

Studies in Growth and Growth Failure: (1) Therapeutic Trial of Growth Hormone. This is part of a Canada-wide MRC project. Dr. Bailey and Dr. Trevor Ham have developed improved methods of measuring growth and are establishing a clinic for the study of physical growth in normal children and children with growth problems; (2) with Dr. Julio Martin of the Biochemistry Division, children with growth hormone

deficiency are being studied as to blood insulin levels in response to glucose load and growth hormone administration. The method is being developed as a means of assessing growth hormone responsiveness.

(b) Investigation is continuing in the study of children with dwarfism associated with metabolic disturbances of mucopolysaccharides in collaboration with Dr. Patrick Conen of the Pathology Research Division and Dr. J.A. Lowden of the Division of Biochemistry. At least one new type of metabolic defect has been partially identified.

(c) Dr. Lionel Weinstein, Research Fellow in the Division, is reviewing the results of treatment of hyperthyroid in children.

(d) Dr. Robert Ehrlich is continuing his investigation of the effects of diazoxide in idiopathic hypoglycaemia and the mechanism ketotic hypoglycaemia. His study of chlorpropamide in the treatment of diabetes insipidus continues.

Gastroenterology (Dr. Richard Hamilton, Director)

The division has expanded its postgraduate training programme to accommodate four trainees in gastroenterology, has organized a successful nine-week seminar course for residents in gastroenterology for residents in Paediatrics, and has initiated combined medical-surgical gastroenterological rounds.

The division continues to be heavily oriented towards research activities. New areas of research have been initiated in addition to studies of metabolic liver disease and pathogenesis of malabsorption. Studies of acute diarrheal disease are in progress, both at a clinical level and in experimental animals. Three types of nutritional study are in progress, the detailed assessment of intravenous alimentation as a therapeutic technique, the assessment of nutritional intake in children with congenital heart disease, and, in the experimental animal, the assessment of various nutritional deficiencies on small intestinal function.

Genetics (Dr. M.W. Thompson, Director)

The new curriculum has led to changes in the teaching of medical genetics, including nine lectures and a three-hour laboratory in Period I (Medical Cell Biology section) and a clinical genetics and genetic counselling elective in Period IB. The division has also taken part in the Human Biology graduate course offered for the first time this year by the Institute of Medical Science. Dr. Margaret Thompson and her students have continued research in genetic aspects of paediatric diseases, especially muscular dystrophy, idiopathic scoliosis, and childhood metabolic disorders.

Haematology (Dr. P.D. McClure, Director)

(1) Hemostasis in newborns and prematures and infants with respiratory distress syndrome – Dr. P.D. McClure; (2) clinical trials of chemotherapeutic agents in malignant disease – Drs. McClure, M. Sonley, E.F. Saunders, R.S. Smith; (3) collaborative studies with the National Institutes of Health in Bethesda on the detection of viral antigens in malignant disease – Drs. McClure and Sonley; (4) studies on the use of oxamate as a growth inhibitor of cells with high LDH/a GPD ratio – Dr. Pryma Skowron; (5) Study of cell kinetics, RNA synthesis, and the effects of drugs such as L-Asparaginase in acute leukemia – Dr. Saunders; (6) study of granulocyte kinetics in patients with chronic neutropenia – Drs. Saunders and P.G. Strachan (Fellow); (7) investigation of the feasibility of an immunotherapy trial in acute childhood leukemia – Drs. Sonley, Saunders, McClure, and Smith, in collaboration with Dr. Cinader.

Infectious Disease (Dr. Crawford Anglin, Director)

This division prepared two 40-minute audio-visual tapes on various aspects of Infection Control. Members of the division also produced a booklet entitled "Immunization and Related Procedures" for the physicians of Ontario. A summer student studied the sedimentation rate in neonatal sepsis.

The long-term meningitis study continued with special reference to antimicrobial

therapy in purulent meningitis, supportive therapy in purulent meningitis, fulminating meningococcal sepsis including a protocol for management, and neonatal sepsis, including neonatal meningitis.

Patients with aseptic meningitis were reviewed. The effectiveness of Erythromycin in the treatment of Pertussis was studied.

A project has been initiated in co-operation with Connaught Medical Research Laboratories, Canadian Red Cross Society, City of Toronto Department of Public Health, and the Division of Haematology and Virology, the Hospital for Sick Children to produce a supply of Zoster Immune Globulin of high antibody titre to be used in the prophylaxis of susceptible patients with immune depressed states who may be exposed to varicella zoster infection.

Medical Publications (Dr. Helen Reid, Director)

There has been a steady increase in the processing of scientific papers by this division. In conjunction with the Division of Postgraduate Medical Education, this division conducted the first National Workshop in Scientific Writing. A preview and rehearsal service for oral presentations, initiated in co-operation with the departments of Visual Education and Biostatistics has been most successful as the first step to developing communications "Packages."

Metabology (Dr. Donald Fraser, Director)

Studies by Dr. Donald Fraser: (1) magnesium metabolism in experimental animals; (2) prevention of urolithiasis in rats by a pyrophosphate analogue; (3) clinical studies of patients with metabolic bone diseases and disturbances of parathyroid function, hypoparathyroidism, idiopathic juvenile osteoporosis, and pseudohypoparathyroidism.

Studies by Dr. I.C. Radde: (1) measurement of calcium ion activity; (2) calcium transport; (3) studies of calcitonin.

Studies by Dr. A. Sass-Kortsak: investigation of biochemical and genetic aspects of inborn errors of amino acid metabolism.

Dr. W. Hanley continued his studies of phenylketonuria.

Neonatology (Dr. Paul Swyer, Director)

Research activities include the following: (1) *Mechanical Artificial Ventilation:* (a) an investigation into the physiology of assisted ventilation in pulmonary disease of the newborn, (b) a paired sequential study of nasal mask assisted intermittent positive pressure ventilation, (c) a trial of intermittent negative pressure artificial ventilation; (2) a study of arterial shunting in patients with congenital diaphragmatic hernia; (3) a study of the use of acetyl choline as a vasodilator in the respiratory distress syndrome; (4) a continuing medical audit of the experience of the Neonatal Division is in progress; (5) follow-up studies of growth and development of survivors of mechanically assisted ventilation (in collaboration with the Department of Psychology); (6) a study comparing survival experience for infants less than 1000 gm. in 1960-61 with that for 1967-68; (7) a study of the role of the thyroid gland in the neonatal increase in metabolism of lambs; (8) intravenous feeding of low birth weight infants; (9) a study on ionized calcium in neonatal hypocalcemia in conjunction with Dr. Radde; (10) measurement of functional residual capacity by helium dilution.

During the past year, a programme was initiated for the early discharge of premature babies, in conjunction with the Public Health Service Department of the Hospital and the Metropolitan Toronto Public Health Service.

Nephrology (Dr. C. Phillips-Rance, Director)

The chronic dialysis programme for treatment of end stage renal failure has expanded and six children are at present on the chronic dialysis programme while awaiting renal transplantation. Five children have received renal transplants during the past year.

Research activities include the following: (1) percutaneous renal biopsies in the nephrotic syndrome, analyzed by light microscopy and electron microscopy; (2) the

role of immunosuppressive drugs in the treatment of children with nephrotic syndrome and other glomerular diseases; (3) calcium and phosphorus metabolism and disturbed parathyroid function in children with chronic renal failure and renal osteodystrophy; (4) protein and amino acid loss during peritoneal dialysis in children; (5) sodium transport across the red cell membrane in patients with cystic fibrosis of the pancreas and in other patients with acid base disturbances.

The Fellows in Nephrology have studied children with hypertension and also patients with haemolytic uremic syndrome.

Neurology (Dr. J.S. Prichard, Director)

Research activities include the following: (1) Dr. J.A. Lowden is studying lipids in brain; (2) Dr. Flavio Coceani is studying the functional significance of prostaglandins in brain; (3) Dr. E.G. Murphy is studying nerve conduction velocity in prematurity as well as in children with diabetes and renal failure. His studies in hereditary diseases of muscle continue; (4) Dr. J.C. Steele is conducting a double blind study of a new anti-convulsant; (5) Dr. A. Rebhan continues her studies in children with learning disabilities.

Out-Patients (Dr. D.A. Stewart, Director)

Studies on streptococcal pharyngitis continue.

HONOURS

A.D. JONES, Mead Johnson Fellowship by the Canadian Paediatric Society.

SCHOLARLY ADDRESSES

T. BALIAH and C.P. RANCE, "The Treatment of Advancing Renal Failure in Children, including Dialysis and Transplantation," Canadian Paediatric Society, Montreal.

T. BALIAH, *et al.* "Role of Coagulation in serum sickness nephritis in Rabbits," Canadian Society for Clinical Investigation, Montreal.

F. COCEANI, "The Hormonal effects of Prostaglandins," International Symposium on Hormones and Atherosclerosis, Milan, Italy.

C. COLLIN-WILLIAMS, "Incidence of Isolated Deficiency of Immunoglobulin iga in the serum of Canadian Children," American College of Allergists, Bal Harbor, Fla. and Canadian Society of Allergy and Clinical Immunology, Ottawa.

R.S. FOWLER, "Congestive Failure in Children," Canadian Association for Research in Toxicology, Third Annual Symposium on "Perspectives in Toxicology of Cardiovascular Drugs," Toronto; "The Vectorcardiogram in Aortic Stenosis in Childhood," XI International Symposium on Vectorcardiography, New York.

J. D. KEITH, "Course of 1500 cases of Ventricular Septal Defect - Improved Prognosis," Symposium on "The Natural History and Progress in Treatment of Congenital Heart Defects," Toronto; "Ventricular Septal Defect," Cardiac Clinic Reunion, Baltimore, Maryland.

B.S.L. KIDD, "Cardiovascular Responses to Hypoxaemia under Methoxyflurane," Canadian Federation of Biological Societies, Edmonton, Alberta; "Hypoxic Pulmonary Vasoconstriction in Anaesthetized Dogs with and without Controlled Ventilation," Canadian Federation of Biological Societies, Edmonton, Alberta; "Left Ventricular Volumes in children: A single plane cine technique," Canadian Cardiovascular Society, Quebec City; "Transportation of the Great Vessels - Incidence of Subgroups and Subsequent Course," Symposium on "The Natural History and Progress in Treatment of Congenital Heart Defects," Toronto; "The Independent Roles of PaCO₂ and pH in determining the pulmonary vascular response to hypoxia in intact dogs," Canadian Federation of Biological Societies, Montreal.

P.D. McCLURE, "Diffuse Intravascular Clotting in Children," Canadian Medical Association Meeting, June 1969.

L.K. McNEILL and J.R. HAMILTON, "Immediate response to wheat gluten in children with treated celiac disease," Canadian Association of Gastroenterology.

E.G. MURPHY, "Aetiology of Mental Impairment in the Duchenne Type Dystrophy," International Congress of Muscle Diseases, Milan, Italy.

J. MURRAY and P.C. FLEMING, "Ampicillin in the Treatment of Bacterial Meningitis of Childhood," Ninth Interscience Conference on Antimicrobial Agents and Chemotherapy, Washington, D.C.

P. M. OLLEY, "Follow-up of Children treated with intracardiac repair" (Tetralogy of Fallot), Symposium on "The Natural History and Progress in treatment of Congenital Heart Defects, Toronto; "Pneumonectomy: its effect on the remaining pulmonary circulation," Canadian Federation of Biological Societies, Montreal; "Experimental Congenital Diaphragmatic Herniae," Canadian Federation of Biological Societies, Montreal.

J.S. PRICHARD, "Whither Neurology?" Canadian Congress of Neurological Sciences, Montreal; "Learning problems in Children," Down State University of New York.

A. SASS-KORTSAK, "Role of amino acids in the biological transport of copper," Annual Meeting of European Society for Pediatric Research, Interlaken.

E.F. SAUNDERS, "Pathogenesis of Acute Leukemia. New Concepts based on Cell Kinetics," Queen's University, Kingston.

J.C. STEELE, "Polyneuritis Cranialis," Ninth International Congress of Neurology, New York; "Mycoplasma as a determinant of the Landry-Guillain-Barrie Syndrome and acute cerebellar Ataxia," American Neurological Association, Miami, Fla.; "Complicated Migraine in Childhood and Infancy," Canadian Neurological Society, Toronto.

P.R. SWYER, "Perspectives in Toxicology of Cardiovascular Drugs," Symposium, Canadian Association for Research in Toxicology, Toronto; "Treatment of Respiratory Distress Syndrome," Symposium on "Recent Advances in Intensive Care," Paediatric Anaesthetic Conference, the Hospital for Sick Children, Toronto; "Physiologic Principles in the care of the distressed newborn infant," Canadian Society for Clinical Investigation, Montreal; "Respiratory Distress in the newborn," Conference on Paediatric Broncho-Esophagology, the Hospital for Sick Children, Toronto; "The Value of assisted ventilation in respiratory distress syndrome," Albany Medical College of Union University, Albany, N.Y.; "Treatment of respiratory failure in the respiratory distress syndrome of the newborn," Ninth Annual Conference on Maternal and Perinatal Health, Michigan State Medical Society, Flint, Mich.

M.W. THOMPSON, "Significance of Detection of Heterozygotes," International Congress of Clinical Pathology Symposium on Metabolic Diseases, Montreal; "Genetic Abnormalities," Annual Meeting of American College of Obstetrics and Gynecology, District V Symposium on Teratology, Niagara Falls, Ont.; "Genetic Counselling," Conference on Birth Defects, State University of New York, Buffalo, N.Y.

P. WEI, "Urinary excretion and renal clearances for D-penicillamine in humans and the dog," Association for the Study of Liver Diseases.

M.G. WOLFISH, "Adolescent Out-Patient Care Standards," Society for Adolescent Medicine, Washington, D.C.

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- HAMILTON, J.R. *et al.* "The Small Intestine in Vitamin D Dependent Rickets" (*Pediatrics*, vol. 45, 1970, pp. 364-73).
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- IZUKAWA, T. *et al.* "Aneurysm of the Membranous Ventricular Septum. A Method of Spontaneous Closure of Small Ventricular Septal Defect" (*American Journal of Cardiology*, vol. 24, 1969, p. 531).
- "Cardiac Catheterization in the Newborn: Experience with 100 Cases" (*Pediatrics*, vol. 44, 1969, p. 24).
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- "Surgical Palliation in Complete Transposition of the Great Vessels - Experience with the Edward Procedure" (*Canadian Journal of Surgery*, vol. 12, 1969, p. 83).
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PATHOLOGICAL CHEMISTRY

Under the direction of Professor A.G. Gornall

I want to first record a feeling of satisfaction in this department with the final report of the Independent Planning Committee. This report incorporates proposals for future developments in clinical biochemistry that will place Toronto in the front rank of medical schools providing an integrated programme of teaching, research, and laboratory service. It is to be hoped that the collective effort and experience that went into the drafting of these recommendations will not be subject to alterations based on expediency rather than reason. We do have reservations about one suggestion in the report. On p. 157 there is an implied recommendation that each hospital should have its own Associate Dean. If division heads can relate directly to an associate dean on departmental matters it would have the effect of creating virtually independent medical schools. It would tend also to undermine the capacity of departmental chairmen to meet their responsibility for developing and co-ordinating the various divisions of their departments.

The need felt most keenly at the present time is a new administrative relationship between the University and the hospitals that will encourage a co-operative effort in a great enterprise. In my view, the key individuals in any integrated university-hospital system are the executive directors and the clinical departmental chairmen. The directors have responsibility for the internal organization and excellence of their hospitals, particularly in relation to patient care. The chairmen have responsibility for developing and co-ordinating the several hospital divisions of their departments, particularly in relation to teaching and research. The director must have an interest in, and a degree of responsibility for, the academic activities that are carried out by the various departments in his hospital. The chairman must have an interest in, and a degree of responsibility for, the services to patient care that are provided by the various divisions of his department. Such a balance of "vertical," "horizontal," "primary," and "sec-

ondary" responsibilities should have the potential for working smoothly and well. What is needed is the organization to bring these key persons into a co-operative functional relationship.

Undergraduate Teaching

The staff of this department has felt rather keenly the expropriation of its responsibility for providing a course in clinical biochemistry to medical students. For some of our staff the new curriculum means a heavy increase in teaching responsibility. In no instance does it mean a decrease since our course (the biochemistry and physiology of human disease) will continue to be offered to graduate students and diploma candidates, probably to final-year life science students and possibly as an elective to Period II students. We are still concerned about the prospect of medical students learning to handle laboratory information rationally unless there is more contact with laboratory professionals.

Graduate Teaching

Graduate courses in the department have grown in importance. Under the supervision of Dr. N.Z. Stanacev, course 1004 (Frontiers of Research) was presented by several members of staff to 8 graduate students. Graduate course 1005 (Clinical Chemistry) was provided by several clinical chemists in the teaching hospitals under the supervision of Dr. C.J. Porter. Dr. W. Paul presented course 1007 (Chemistry of Biological Systems) to 10 engineering students in the Institute of Bio-Medical Electronics. He has also initiated this year course 1009 (Radioisotopes in Clinical Chemistry), intended primarily for diploma candidates.

A total of 20 graduate students were registered in the Department during the year, 6 proceeding to the Ph.D. degree. Two candidates completed requirements for the M.Sc. degree, and 4 more students expect to submit theses during the summer.

Postgraduate Teaching

The department sponsored a half-day in the Refresher Course for Practising Pathologists held in February. Dr. W. Paul again was moderator of the 14th Annual Postgraduate Course on Radioactive Isotopes.

One candidate completed requirements for the Diploma in Clinical Chemistry during the year, and three more are expected to come up for examination in the fall. There have been over twenty applications for three vacant places in this course, pointing to the need for an early expansion of hospital facilities as recommended in the IPC report. Provision of residency stipends for non-medical candidates in this programme also continues to be a problem but one that we hope is on its way to resolution.

Medical residencies in clinical biochemistry, available at Sunnybrook and New Mount Sinai hospitals, have continued to be well received.

There were 11 postgraduate students registered in the department during the year, 5 of them in the Diploma Course.

STAFF

Banting Division

Dr. J.A. Dauphinee will retire from active responsibility in the department and become Professor Emeritus on July 1 after 23 years of service. He was Chairman for 19 years, the longest period this responsibility has been held by one person. It would require several pages to enumerate the contributions he has made to the department, our Faculty, the University, and the community. His interest never strayed far from service to patients. With wisdom and foresight he introduced many new analytical procedures in his own laboratory and guided several of our hospitals in the development of their clinical biochemistry services. He played a major role in introducing the use of radio-

nuclides, electrolyte, steroid, enzyme, and trace metal studies and was a pioneer in Toronto in the establishment of first-class clinical investigation facilities. As a friend and counsellor he could not be surpassed.

All members of the senior staff have served energetically and with dedication to the work and objectives of the department, the Faculty, and the University. Dr. W. Paul has been awarded a Commonwealth Medical Fellowship and beginning September 1 will spend a sabbatical year at the Institute of Nuclear Medicine, Middlesex Hospital Medical School, London, England.

In July we shall welcome to our staff Dr. C.C. Liew as Assistant Professor. Dr. Liew earned an M.A. in Physiology and in 1967 a Ph.D. in Pathological Chemistry from this University. After one postdoctoral year in Toronto he has spent the past two years as a Canadian Heart Foundation Fellow in Britain and the USA. His energy and competence are reflected in a total of six publications resulting from these two years. We look forward to the contribution of knowledge and enthusiasm that he will bring to the department.

Visiting Lecturers to the department during the year, supported by the School of Graduate Studies, have included Dr. D.H. Curnow, University of Western Australia; Dr. M. Jutisz, Collège de France; Dr. J. Orloff, National Institutes of Health, USA; Dr. R.M. Epand, University of Guelph; Dr. C.C. Liew, the Rockefeller University, New York; Dr. R.P. Cook, the University of Dundee, Scotland, and Dr. S. Liao, the University of Chicago, USA.

It is appropriate that I express my thanks to Mr. Downs, Miss Dix, and the secretarial staff, for their assistance during the year.

Hospital Divisions

The Heads of the Clinical Biochemistry departments in our teaching hospitals hold senior appointments in Pathological Chemistry and form a major advisory committee of the department.

The Department of Laboratories at Toronto General Hospital has been re-organized and a Department of Clinical Biochemistry has been formed with Dr. C.J. Porter as Head. We record with regret the resignation of Mrs. S. Bjerre as Research Associate and welcome Dr. Valerie Jones as a new member of staff.

Head of the Department of Clinical Biochemistry at Sunnybrook Hospital is Dr. A. Malkin. He reports two resignations to take effect July 1. Dr. D.Z. Borensztajn will enter postgraduate training in Psychiatry, but will retain an affiliation with the department. Dr. D. Lovell will be returning to a post in England. Dr. R.W. Moore becomes Assistant Professor and Dr. R.C. Ellis a Lecturer in the Department on July 1.

At Toronto Western Hospital we record with deep regret the resignation of Dr. A. Rapoport as Associate Professor, because of the pressure of other responsibilities. Dr. R.R. Ogilvie has been made Assistant Professor and Acting Head of the Department of Clinical Biochemistry and Dr. H. Husdan also becomes Assistant Professor in July. The importance of immunochemistry and of the contributions made by Dr. S. Dubiski in this field have been recognized by his cross-appointment and promotion to Associate Professor.

At the Hospital for Sick Children the Department of Clinical Biochemistry has a division of clinical chemistry service and a division of biochemistry research. Dr. S.H. Jackson is Head of this department and it is hoped the new organization will promote a closer relationship between the research and service functions of clinical biochemistry.

At the New Mount Sinai Hospital the contributions of Dr. Alan Pollard to his division of Clinical Biochemistry and to this department have been recognized by his promotion to Associate Professor. Dr. J.J. Clapp has been appointed Lecturer.

It is a pleasure to record the establishment of a Department of Clinical Biochemistry at the Wellesley Hospital with Dr. L.A. Wright as Assistant Professor and Head. Dr. Wright is a former graduate of our department and obtained his professional experience at the Montreal General Hospital.

It gives us pleasure also to welcome Dr. F.H. Sims who brings a wealth of experience gained in New Zealand and Great Britain to his post as Associate Professor and Head of the new Department of Clinical Biochemistry at the Women's College Hospital.

RESEARCH

Banting Division

Under the guidance of Professor A.G. Gornall work on the endocrinology and metabolism of heart muscle, and studies of enzyme structure have continued. Mrs. B.J. Cadeau, candidate for the Ph.D. degree, has shown that adrenalectomy alters the levels of certain tricarboxylic acid cycle intermediates in heart muscle and that the hormone aldosterone has the unique ability to reverse these alterations. Dr. D.K. Liu, a post-doctoral fellow, has found that adrenalectomy results in a fall followed by a rise in the activity of condensing enzyme in rat heart but the levels remain low in rat kidney; malate dehydrogenase activity is not affected. Dr. K.C. Wong, sponsored jointly as a postdoctoral fellow with the Department of Medicine, has studied the placental transfer and sub-cellular binding of thyroid hormones and observed a different pattern of uptake T_3 and T_4 by this tissue. Mrs. M. Kandel, Research Associate, in collaboration with Dr. S. Kandel of the Faculty of Pharmacy and assisted by Miss M. Goettsch and Mrs. Beysovec, has continued her investigations of the active site of bovine carbonic anhydrase B and has shown that sulfonamide inhibition of the enzyme is stoichiometric and pseudoirreversible. Of new inhibitors tested, N-bromoacetyl acetazolamide reacts specifically with the 1-N of a histidine at the active site of human carbonic anhydrase B, indicating that there are at least two histidines at or around the active site of this enzyme.

Professor J.A. Dauphinee assisted by Mrs. A. Endrenyi has continued studies of blood arginase activity. Both in plasma and in red cells the enzyme is present largely as inactive proarginase. Activation can be effected by a suitable combination of factors including pH, temperature, and manganese ions. Studies of plasma arginase in patients with liver ailments and other disease have been undertaken. Copper metabolism studies are continuing in patients with hepatolenticular degeneration.

Professor W. Paul has continued his work on four main problems. In collaboration with colleagues in the Institute of Bio-Medical Electronics and assisted by Mr. Timanoff, he has concentrated on two aspects of the development of a gamma camera: (a) the matrix of scintillation crystals and (b) the physical characteristics of the second-stage gated optical amplifier. In an effort to improve lung ventilation measurements Dr. Paul has prepared $^{13}\text{N}_2$ by radiating liquid nitrogen in the intense photon beam of the LINAC. Studies have indicated no contaminating elements in the vapour phase and permission to use this radionuclide in patients has been requested. Dr. Paul was co-supervisor of a graduate student, Dr. M.L. Schwartz, who has developed a technique for studying by autoradiography the uptake of tritiated steroids by the brain of mice and in experimental Ependymoblastoma. Attempts to improve the construction of ear-pieces for oximetry measurements have continued.

Professor A.D. Baines, in conjunction with Mrs. Irene Godi, is continuing a study of variations in glomerular and proximal tubular function between nephrons located on the surface of the kidney and those located near the medulla. Alterations in the ratio of superficial to deep nephron function have been implicated as causally linked to changes in water and sodium output in the urine with chronic salt loading. Mr. K.E.Y. Tabetlo, candidate for the Ph.D. degree, is examining the excretion of water and sodium by rat kidneys in which a chronic reduction in renal mass has been induced. Mr. J. Bishop is assisting in a micropuncture study of the interrelationships between water, sodium, and glucose transport from the proximal tubule of rat kidneys.

Professor G. Feuer, with graduate students S.D. Cooper, Miss P. Gibbs, and R. Kardish and assisted by Mrs. H. Belina, has continued investigations on the effect of foreign compounds on the biochemical organization of the liver cell. Studies with

various closely related coumarins have shown: (a) the hepatotoxicity of coumarin is associated with the entire molecule; (b) the degree of induction of drug metabolism by methylcoumarin is dependent on the position of the methyl group; (c) the presence of a hydroxyl group in the coumarin or 4-methylcoumarin caused reduction of both hepatotoxicity and inducing capability; and (d) the different liver responses are unrelated to lipid solubility, absorption, or metabolism of the various coumarins. Studies with pregnant animals and newborn litters have shown: (a) the reduction of drug metabolizing enzymes is unrelated to altered levels of coenzymes or other factors required for the activity and (b) during pregnancy and in the newborn, enzyme inhibition is probably associated with metabolites or by-products of estrogen or progestational hormones.

Professor N.Z. Stanacev, with his group (F.J. Carmichael, Ph.D. candidate, J.B. Davidson, special student, and Mrs. L. Stuhne-Sekalec, research assistant), has continued studies on the biochemistry and metabolism of complex lipids. In addition to the established pathway for the biosynthesis of phosphatidylglycerol and phosphatidylglycerophosphate in brain, the mechanisms of the enzymatic reactions for the formation of these lipids have been established. Other studies (in collaboration with Professor K.M. Anderson) on the effect of testosterone on the biosynthesis of phosphatidylglycerol in ventral prostate have been completed.

Professor K.M. Anderson has directed the work of two graduate students. Studies concerning the effects of hormones on protein synthesis in isolated rat liver and prostate nuclei have been carried out by H. Crosthwait and Mrs. M. Slavik. Mr. I. Mendelson has examined RNA species synthesized *in vivo* and *in vitro* by nuclei from normal rat mammary glands and from carcinogen-induced rat mammary gland tumours. Miss C. de la Torre has carried out studies on the effects of hormones on organ cultures of rat mammary glands obtained from these two sources. With Dr. J.A. Kellen, studies have been made of tumour-initiation and DNA synthesis in carcinogen-induced rat mammary tumours.

Professor J.A. Kellen has directed the work of V. Lustig (candidate for the M.Sc. degree) and special student J. Lo, assisted by Mrs. D. Kaspar. Rat mammary tumours have been induced by dimethylbenz (α) anthracene. The combined administration of actinomycin D resulted in a statistically significant decrease in tumour incidence and a clear-cut delay in palpable tumour appearance. The tumours were strong antigens, producing antisera with high titers and specificity in rabbits. Cross reactions against normal organs, serum, and embryonic tissues from rat were studied. Tumours ranging from evident malignity (multiple diploid cells) to benign adenofibromas gave identical immunological reactions. All tumours contain alkaline phosphatases of a very labile type, inhibited by 0.05 M methionine, arginine, alanine, homoarginine and phenylalanine, and themolabile at 56°.

Professor J. G. Silah has directed the work of Dr. G. Turcotte and Miss E.A. Lewis, candidates for the M.Sc. degree, assisted by A. Mirakian. It has been shown that the capacity of rat liver to reduce ring A of adrenal steroids is increased in experimental hypertension. This has been traced to a change in microsomal Δ^4 -5 α -hydrogenase activity. In addition, it has been shown that the rate of hepatic sulfation is markedly increased during experimental hypertension. An oxygen atmosphere produced the same effect. It has been postulated that high blood pressure, or its causative factors, in some way affects the enzymes involved in the metabolic transformation of corticosteroids by the liver.

In all these studies the support of the Medical Research Council, the Ontario Cancer Treatment and Research Foundation, the Ontario Heart Foundation, the Atkinson Charitable Foundation, the Ontario Mental Health Foundation, and Abbott Laboratories Ltd. is gratefully acknowledged.

The Hospital Divisions

At Toronto Western Hospital Dr. S. Dubiski has continued research on the genetic control of antibody synthesis and on the phenomenon of "allotypic suppression." The

role of allotypes (genetically controlled structures which are part of antibody molecules) in the immune response was pursued. Two new allotypic specificities of rabbit γ G immunoglobulins were described; their genetic and structural relationship to the other allotypes was studied. Dr. A. Rapoport and Dr. H. Husdan have continued their metabolic studies of the following problems: (a) chromium-corrected balance studies of calcium, magnesium, and phosphorus in patients with renal osteodystrophy; (b) factors influencing the excretion of urinary hydroxyproline; (c) factors influencing the measurement of serum total and plasma ionized calcium. Dr. R.R. Ogilvie has been involved in studies of automated, sequential multiphasic analyses.

At St. Michael's Hospital Mrs. G.C. Buckley and M. O'Sullivan have collaborated with Dr. J.A. Little in a study of the interrelationship between the kinds of dietary carbohydrate and fat in hyperlipidemic patients.

At Sunnybrook Hospital Dr. D.Z. Borensztajn has developed a method of tissue culture of rat adenohypophysis and adrenal cortex. These cultures have been shown to be sensitive to corticotropin releasing factor (CRF) and ACTH respectively. The technique has been used to assay the concentration of CRF in the hypophyseal portal system under different physiological and therapeutic conditions. The influence of stress, mood elevators, and tranquillizers on the secretion of CRF has been studied on over 300 rats. The biochemical changes in mania-depression have been followed with emphasis on catecholamines and corticosteroids. Under the supervision of Dr. A. Malkin and Dr. D. Lovell, Mrs. B.J. Cadeau has initiated studies of the fractionation of isoenzymes of alkaline phosphatase. A graduate student, A. Jahn, is developing disc gel electrophoresis techniques for the separation of isoenzymes.

At the Hospital for Sick Children Dr. S.H. Jackson has continued his studies on the reutilization of mature collagen in the generation of granuloma tissue. His graduate student, J. Heininger, is preparing a Master's thesis on the results of one phase of these studies. Collaborative studies with Dr. A. Sass-Kortsak on anomalies of amino acid metabolism continue.

At the New Mount Sinai Hospital Dr. A. Pollard is experimenting with the design and construction of an apparatus for the automation of radioimmunoassays. He is co-supervisor of Miss F. Timanoff, M.Sc. student, who is working on the assay of estrogen metabolites in urine.

At the Clarke Institute of Psychiatry Dr. D.D. Godse is developing techniques for the continuous monitoring of certain lipids in the plasma.

Two cross-appointed professors continue to make notable contributions to departmental teaching and research. Dr. B. Cinader and his colleagues in Medical Cell Biology have been studying enzyme activation by specific antibody and have shown that the combination of S-peptide with S-protine is promoted by this antibody. With Drs. S. Dubiski and C.T. Chou, he has pursued studies of the genetic control of the antibody response; with Dr. J.E.M. St. Rose and a graduate student, B.H. Sabiston, he has studied the genetic factors that control tolerance induction and tolerance breakdown. Other studies have included cell receptors on thymus and bone marrow cells and the phenomenon of immunosuppression by antibody and by antilymphocyte serum. Dr. S.L. Cohen, in the Department of Obstetrics and Gynaecology, has been co-supervisor of Miss F. Timanoff, candidate for the M.Sc. degree, and has continued his studies of conjugated and "labile" estrogens and the inhibitory effect of estriol on some of the actions of estradiol.

At the Medical Unit of the Addiction Research Foundation Dr. J.S. Olin has continued to direct extensive, multidisciplinary studies into the consequences of addiction to alcohol and certain drugs.

HONOURS

DR. D.Z. BORENSZTAJN was elected an active member of the New York Academy of Sciences, and became a founding member of the International Society of Psychoneuroendocrinology.

DR. B. CINADER has been elected a member of the Gesellschaft für Immunologie. He served on invitation as Visiting Professor at the University of Saskatchewan, and has been session chairman at three international meetings: the International Congress of Biochemistry in Switzerland; International Congress of Microbiology in Mexico; and the International Symposium on Biological Activities of Complement, in Guelph, Ontario.

DR. W. PAUL has been awarded a Commonwealth Medical Fellowship for one year's study and research at the Institute of Nuclear Medicine, Middlesex Hospital Medical School, London, England.

SCHOLARLY ADDRESSES

Academic Clinical Laboratory Physicians and Scientists, Annual Meeting, San Francisco, May 1970; A. POLLARD, "University Role in Delivery of Laboratory Services and Personnel Training."

Canadian Federation of Biological Societies Thirteenth Annual Meeting, Montreal, June 1970: K.M. ANDERSON and H.C. CROSTHWAIT, "Synthesis of Protein by Isolated Rat Ventral Prostate Nuclei"; B.J. CADEAU and A.G. GORNALL, "Effects of Aldosterone on Tricarboxylic Acid Cycle in Heart Muscle"; J.B. DAVIDSON and N.Z. STANACEV, "Mechanism of Biosynthesis and Configuration of Polyglycerophosphatides in Animal Brain"; G. FEUER and P.A. GIBBS, "Some Aspects of the *in vivo* Action and the *in vitro* Metabolism of Coumarin and 4-Methylcoumarin"; G. FEUER, J.C. SOSA-LUCERO, G. LUMB, and G. MODDEL, "Extra-hepatic Drug Metabolism"; V. LUSTIG and J.A. KELLEN, "Species, Organ and Subcellular Specificity of Alkaline Phosphatases."

Clinical Research Society of Toronto, Annual Meeting, May 1970; G. FEUER, R. KARDISH and R. FARKAS, "The Neonate Hepatic Function and Drugs."

Coloque National de Neuroendocrinologie, Paris, September 1969; D.Z. BORENSZTAJN, "Une étude sur la variabilité de la concentration du CRF (corticotropin releasing factor) dans Le Système Porte Hypophysaire."

Federation of American Societies for Experimental Biology, Fifty-fourth Annual Meeting, Atlantic City, April 1970: G. FEUER, "Hepatic Endoplasmic Reticulum Changes Induced by Choline Deficiency and Foreign Compounds."

Hebrew University, Jerusalem, Department of Endocrinology, September 1969: D.Z. BORENSZTAJN, "Factors Influencing CRF (corticotropin releasing factor) Concentration in the Hypophyseal Portal System of the Rat."

Hôpital Maisonneuve, Montréal, January 1970: A.D. BAINES, "La Diversité de la fonction des néphrons superficiels et profonds."

Immunological Club, University of Toronto, May 1970: J.A. KELLEN, "The Antigenicity of DMBA-induced Rat Mammary Tumours."

International Society for Neurochemistry Second International Meeting, Milan, September 1969: D.Z. BORENSZTAJN, "A Study on the Variability of Corticotropin Releasing Factor Concentration in the Hypophyseal Portal System."

International Symposium on Cancer Immunology, Montreal, October 1969: B. CINADER, "Immunologic Tolerance to Autochthonous Tumours."

Second International Convocation of Immunology, State University of New York at Buffalo, June 1970: S. DUBISKI, B. CINADER, and C.-T. CHOU, "Allotypic Specificity as a Cell Marker."

Tenth International Cancer Congress, Houston, Texas, May 1970: K.M. ANDERSON and J.A. KELLEN, "Effects of some Inhibitors on the Induction of Rat Mammary Cancer by 7,12-Dimethylbenz(α)anthracene"; J.A. KELLEN, K.M. ANDERSON, and V. LUSTIG, "Subcellular Distribution of Alkaline Phosphatases in Human Tumors."

Toronto Thyroid Research Group, April 1970: D.Z. BORENSZTAJN, "Factors Influencing CRF (corticotropin releasing factor) Concentration in the Hypophyseal Portal System of the Rat"; K.C. WONG, "Placental T₃, T₄ Protein-binding."

University of Saskatchewan, March 1970: B. CINADER as Visiting Professor, "Genetic Markers as a Probe to the Cellular Events of the Immune Response"; "Immunological Tolerance as a Steering Mechanism of the Immune Response"; "Transplantation Problems"; and "Concepts of Teaching Immunology on the Undergraduate and Graduate Level."

PUBLICATIONS

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- "Allotypy as a Probe"; in *Protides of Biological Fluids*, Proceedings of Seventeenth Colloquium, Bruges 1969, ed. H. Peeters, pp. 189-203. Oxford: Pergamon Press, 1970.
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PATHOLOGY

Under the direction of Professor A.C. Ritchie

This report can record progress and development, but it must also record the gross deficiencies in space, equipment, and staff which hamper the department and prevent it from implementing fully the undergraduate, postgraduate, and graduate programmes that are urgently needed, to say nothing of those which would be desirable. Particular mention must be made of the lack of facilities and staff in the teaching hospitals, none of which has the staff or space to mount properly the new undergraduate curriculum, to develop the postgraduate programme, or to mount the research programmes essential for their health. The overcrowding in the Banting Institute where the disgraceful state of the autopsy rooms and autopsy service remain unchanged, must again be stressed. It is urgently necessary that the department develop in the teaching hospitals units skilled in the pathology of the various sub-specialties of medicine, both to meet the needs of the University and the needs of the sick. Neither funds nor space are available to permit any such development. It is perhaps remarkable, when such increasing demands are being made by the University on the teaching hospitals, that, except for the unit in the Banting Institute, only trivial funds are available from the University to support its teaching programmes in the hospitals.

The introduction of the new undergraduate curriculum in Medicine modified considerably the undergraduate teaching programmes. A somewhat modified course in General Pathology was given in the first two terms for the Medical students who entered Period II of the new curriculum in January 1970. The subject was presented by lecture and demonstration, much as last year. The course was also attended by graduate students from Dentistry and from the School of Graduate Studies. The course in Special Pathology for the students of the Second Medical Year was not given, as these students had entered Period II.

The course in Special Pathology for students in the Third Medical Year was given as in past years. Once again, the co-ordination of the instruction in haematology given in Medicine and Pathology proved helpful.

Little can be said of the new undergraduate curriculum in Medicine. Confusion and doubt, would perhaps, be the two most appropriate epithets at this time.

The course in General Pathology for Dental students was again directed by Dr. N.S. Taichman. The subject was presented by lecture and demonstration, and the further co-ordination of the course with dentistry and the interests of dental students proved most beneficial. A new Laboratory Manual was prepared by Dr. Taichman and Dr. H.L. Freeman, and has proved a very useful adjunct.

The lecture course for students in Physical and Occupational Therapy was organized by Dr. Susan Ritchie. The department also shared in the training arranged by the Toronto Institute for Pastoral Training.

The postgraduate programmes continued as in previous years. Men in training were divided among the teaching hospitals, and taught principally by apprenticeship. It becomes increasingly clear, however, that a more structured programme must be introduced.

The heavy load of teaching given under the Division of Postgraduate Medical Education to men training in other specialties continued. Some 200 hours of lectures and seminars were given. Many members of the department shared in the work, but as in past years, the load fell principally on Dr. W. Anderson.

The Refresher Course for Pathologists in Practice was again organized by Dr. H.T.G. Strawbridge, in co-operation with the departments of Pathological Chemistry and Bacteriology. Some 36 pathologists registered, and again the course proved most successful. Further initiative of this sort would be desirable.

In the School of Graduate Studies, the Advanced Course in Pathology was organized by Dr. Movat. A number of visiting speakers took part. A new course, "Ultrastructural Pathology," was given for the first time, under the direction of Dr. G.T. Simon.

The Division of General and Experimental Pathology continued to prosper under the direction of Dr. H.Z. Movat. Several new men joined its staff, and the scope of its activities has grown.

The department was pleased to welcome back Dr. M.J. Phillips from McGill University. Dr. Phillips is Chief of Surgical Pathology in the Toronto General Hospital and an Associate Professor. Dr. J.B. Cullen returned to the Toronto General Hospital after spending eighteen months at the Royal Postgraduate Medical School and at St. Mark's Hospital in London, England, on an Ontario Training Bursary. Dr. P.D. Sadowski, a Medical Research Council Scholar, returned to the Division of General Pathology as an Assistant Professor, after studying at the Albert Einstein College of Medicine, New York, as a Centennial Fellow. Dr. Alan Medline returned to the Toronto Western Hospital after spending a year with Dr. H. Popper in New York. Dr. C.S. Norman joined the Department of Clinical Pathology of the Wellesley Hospital as Head of the Division of Haematology. Dr. Margaret Norman returned to the Hospital for Sick Children from postgraduate study in New York and Boston. Dr. Arnost Kolin joined the staff at Sunnybrook Hospital. Dr. V.L. Fornasier came back to the Princess Margaret Hospital and Wellesley Hospital, after working at the Royal National Orthopaedic Hospital in London, England. Dr. A.G. Bhagwat joined the staff of St. Michael's Hospital, and Dr. P.S. Symchych was appointed to the staff of the Hospital for Sick Children.

We were sorry to lose Dr. M.J. Ball to the Victoria Hospital, London, Ontario, and Dr. B. Oliver to the Sudbury General Hospital.

Among the many distinguished visitors to the Department were Dr. E.J.G. Olsen, Department of Morbid Anatomy, Royal Postgraduate Hospital, London; Dr. Alvin Volkman, Trudeau Institute, Saranac Lake; Dr. Douglas D. McGregor, Trudeau Institute, Saranac Lake, N.Y.; Professor E. Boyland, Chester Beatty Research Institute, London; Professor Frank Magary, University of Sydney; Professor Lardner, University of Hamburg; Dr. A. Sharp, University of Oxford; Professor D. Williams, Welsh National School of Medicine, Cardiff; Dr. M. Kaplan, Metropolitan General Hospital, Case Western Reserve University, Cleveland.

DIVISION OF NEUROPATHOLOGY

Undergraduate Teaching

A course of 11 lectures was given to the Third Medical Year by Drs. Deck, Rewcastle, and Humphrey in the Fall. In February and March the members of the division participated in the preparation of material for the new Period IIA neuroscience and actively

participated in the lectures and demonstrations of that course. Residents and occasional Neurology staff personnel did some of the Pathology teaching, because the size of the groups necessitated the use of many teachers simultaneously. In the central area, groups averaged about 20 students each. Facilities were borderline. Microscopes could not be used in the teaching experience at the Toronto Western Hospital and could not be stored readily in the central complex area.

Postgraduate Teaching

The number of positions available for Neuropathology residency training has now been increased to six with the creation of two new positions (Toronto Western Hospital, Dr. Deck; Hospital for Sick Children, Dr. Norman). The establishment of a Fellowship Examination in Neuropathology has attracted trainees into the University of Toronto programme, so that these new positions have eased the extra demand. In order to assess the progress of the Neuropathology trainees, a twice yearly practical examination has been established and is now in its second year of operation.

In addition to the regular in-hospital training, the staff and trainees of the Division of Neuropathology now meet twice each month on a rotational basis at the Toronto General Hospital, Toronto Western Hospital, Hospital for Sick Children, Princess Margaret Hospital, and St. Michael's Hospital. These meetings take two forms, one a slide session reviewing interesting material and the other a more didactic presentation by trainees or staff members.

RESEARCH

In the Toronto General Hospital and Banting Institute, Dr. Ritchie and Dr. Raick have continued their work on experimental carcinogenesis. Attention has centred on the effect of orally administered dimethylbenzanthracene on liver cells, with particular reference to the differences in action observed when it is administered at different stages of the mitotic cycle. Ultrastructural studies of the skin have also continued, and the changes which occur in the first few hours after painting with croton oil have been elucidated. Dr. Bishai and Dr. Moscarello are concluding a study of the effect of chalone on the action of carcinogens in the skin.

Dr. Simon and Dr. Bédard, in collaboration with Dr. Pinkerton of Sunnybrook Hospital, have studied the morphology of the epithelial cells and lamina propria of the duodenum in mice, and are studying the ultrastructural changes that occur in the mucosa during iron absorption. With Dr. Schnuda, Dr. Simon is studying the circulation of labelled lymphocytes through the lymph nodes, bone marrow and spleen, and with Dr. Nopjaroonsri, he is studying the phagocytosis of carbon by lymph nodes following its intramuscular injection.

Dr. Silver has classified the chordae tendineae attached to the mitral valve, leading to a better understanding of its anatomy and a fuller understanding of the changes which occur in patients with prolapsed valve leaflets. A similar study of the tricuspid valve is in progress. Dr. Silver has also collaborated in studies on the pathogenesis of canine cardiac allograft rejection, the pathology of idiopathic hypertrophic cardiomyopathy, and of the arrangement, structure, and blood supply of the papillary muscles of the left ventricle.

Dr. Phillips has continued his work on human and experimental liver disease. Biopsies of patients with cirrhosis, hepatitis, and metabolic disorders have been studied by electron microscopy. Experimentally, studies of the role of cytoplasmic organelles in hepatic glycogen metabolism have continued, and the experimental lesions produced in hepatocytes by fructose infusions have been further evaluated.

Dr. Miyai has continued his work on the adaption of rat liver to subacute ethionine intoxication, and working with Dr. Fisher in the Medical Sciences Building has begun studies of isolated perfused livers in ethionine intoxication and as a tool in the study of bile acid metabolism.

Dr. J.H. Crookston and Mrs. M.C. Crookston have studied hereditary dyserythro-

poietic anaemia, the Ii blood group system, and a blood group chimera with unusual Lewis group.

Dr. Ezrin, in association with Dr. Sellers of the Department of Pharmacology, has continued radioautographic studies of the rat adenohypophysis, with particular reference to the thyrotropes. With Dr. Strattman, Dr. Ezrin and Dr. Simon have been studying the fine structure of the rat adenohypophysis in hypothyroidism. Work on the immunolocalization of the various pituitary hormones has also continued.

Dr. Thompson has completed a survey of cytological facilities in Canada, and has extended his study of oral contraceptives and cervical atypia.

Dr. van Nostrand, in collaboration with Dr. Bryce, has begun a study of malignant disease of the larynx.

At the Hospital for Sick Children, Dr. Conen and Dr. Cutz have studied the Kultschitzky-type cells frequent in human foetal respiratory ducts. With Dr. Fulton, Dr. Conen has studied intracytoplasmic filamentous structures found in patients with histiocytosis X, and with Dr. Cutz, has studied the Clara cells in the terminal bronchioles in man, rabbits, calves, and dogs. The relationship of Clara cells to type II alveolar cells has been investigated. With Dr. Bhagwat, Dr. Conen has studied the similarities between pulmonary alveolar proteinosis in man and experimental adjuvant induced pneumonia in rabbits. The metachromasia of cultured fibroblasts in patients with mucopolysaccharidoses, cystic fibrosis, and other conditions is also under study. Eleven infants with abnormalities were found in a chromosome study of 1,000 newborn males.

At the Toronto Western Hospital, Dr. Rabinovich has shared in a multidisciplinary study of patients with chronic renal failure and bone disease.

Dr. Pantalony and Dr. Sekeguchi are studying abnormal haemoglobins in the prenatal population of the Toronto Western Hospital, and the quantitative of fibrin split products and their detection with simple tests.

In the Division of General and Experimental Pathology, Dr. Movat has continued his work on the isolation of the components of the plasma kinin system, and the study of their interaction. He has also investigated the interrelationship between the kinin, clotting, and plasminogen plasmin systems, and has continued his work on the isolation of phlogistic agents from polymorphonuclear leukocyte lysosomes.

Dr. Ranadive is studying the cationic proteins of the neutrophils and their role in immunologically induced inflammation.

Dr. Sadowski has continued his investigation of the role of bacteriophage T4 endonuclease II and IV.

Dr. Taichman is investigating the injury produced by heterophile antibodies in the guinea pig, the release of intracellular constituents from rabbit polymorphonuclear leukocytes exposed to soluble immune complexes, and the ultrastructural alterations which occur in guinea pig mast cells during anaphylaxis.

Dr. Udaka has continued his work on the Arthus reaction, identifying the cells responsible for the reaction, and studying further the vasoaction proteases and peptides active in it.

Working in the Department of Zoology, Dr. Bell has continued his study of chromosomal abnormalities in the newborn.

Division of Neuropathology

The following lines of investigation are currently under way:

(1) Histochemical analysis of human muscle biopsy material in various diseases, with demonstration of how such analyses of enzyme histochemical preparations are indicative of certain disease states not readily demonstrable by routine light microscopic methods (Drs. Bouchard, Rewcastle, and Humphrey).

(2) Review of case material with light and electron microscopical correlation of changes occurring in myotonic dystrophy: an attempt is being made to elucidate whether true attempted regeneration is occurring in this disease and whether RNA can be demonstrated in the sarcoplasmic masses that occur (Dr. Rewcastle).

(3) The study of the structural changes occurring in Creutzfeldt-Jakob disease in the human and in the chimpanzee brain following transmission of this human central nervous system "degenerative" disorder is being performed. Nine cases of this disease have now been transferred to chimpanzees, of which two cases are from the Toronto teaching hospitals. This study is in collaboration with the Laboratory for Slow, Latent and Temperatue Viral Diseases, National Institutes of Health, Bethesda, Md. (Drs. Becker, Rewcastle, and Deck).

(4) We have completed a human anatomical-functional study of the correlation between stimulating electrode tracts and patient responses to stimulation in mapping out the somatosensory areas of the human thalamus (Drs. P. Richardson, Tasker, and Rewcastle).

(5) Dr. Armstrong is attempting to establish cultures of human skeletal muscles as a preliminary to the *in vitro* responses of muscle fibres from patients with neuromuscular diseases.

(6) Drs. Rewcastle and Wherrett are collaborating in studying two brothers with a systemic form of lipidosi, the nature of which has not been previously described.

Research grants have been received from the Medical Research Council of Canada and the Muscular Dystrophy Association of Canada during 1969-70.

HONOURS

DR. RITCHIE served as President of the VIIth International Congress of Clinical Pathology held in Montreal in July 1969, and as Past-President of the Canadian Association of Pathologists. He was appointed Chairman of the Pathology Committee of the Royal College of Physicians and Surgeons of Canada.

DR. D.W. THOMPSON was elected Chairman of the Canadian Society of Cytology.

DR. R.C. ROSS was elected President of the Ontario Association of Pathologists.

DR. M.J. LYNCH was elected Chairman of the Section of Clinical Pathology of the Ontario Medical Association.

DR. A. KATZ served as Chairman of the Section of Pathology of the Academy of Medicine, and DR. B. CRUICKSHANK as its Secretary.

DR. M.J. PHILLIPS was appointed Programme Chairman for the Canadian and Ontario Associations of Pathologists.

DR. P.H. PINKERTON was awarded the Carveth Junior Scientific Award for 1969.

DR. A.G. BHAGWAT was awarded the Ontario Association of Pathologists Prize.

SCHOLARLY ADDRESSES

Dr. A.G. Bhagwat spoke on ultrastructural and biochemical changes in the rabbit in prednisolone-induced hepatic injury to the American Association of Pathologists and Bacteriologists, St. Louis, Missouri, March 1970; on a clinico-pathologic study of desquamative interstitial pneumonia and pulmonary alveolar proteinosis in childhood at the International Academy of Pathology, St. Louis, Missouri, March 1970; and on prednisolone-induced hepatic injury in experimental animals, at the Pathology Monthly Meeting, Toronto, April 1970. Drs. Conen and Surana spoke on the small extra metacentric chromosome in four patients and a normal individual at the 3rd International Conference on Congenital Malformations, The Hague, Netherlands, September 1969, and on "new" translocation in three generations of a family $t(1q + ;2q -)$ at the Somatic Cell Genetics Conference, Chatham, Cape Cod, Mass., October 1969. Dr. Cutz and Dr. Conen reported on the electron microscopy and histochemistry of bronchiolar epithelium in man and experimental animals at the Ontario Association of Pathologists, London, October 1969. Dr. Bhagwat, Dr. Wentworth, and Dr. Conen spoke on desquamative interstitial pneumonia (DIP) and pulmonary alveolar proteinosis (PAP) in childhood at the Ontario Association of Pathologists, London, October 1969. Dr. Cutz and Dr. Conen reported on the ultrastructure and cytochemistry of Clara cells at the International Academy of Pathology, St. Louis, March 1970, and on the ultrastructure of human bronchiolar Kultschitzky-type cells at the American Society for Experimental Pathology, in Atlantic City, in April 1970. Dr. Higurashi and Dr.

Conen spoke on the comparison of chromosomal behaviour in cultured lymphocytes and fibroblasts from patients with chromosomal disorders and controls at the American Society for Experimental Pathology in Atlantic City, April 1970; Dr. Conen reported on congenital chromosomal abnormalities and leukemogenesis at the Xth International Cancer Congress in Houston, May 1970, and Dr. Conen, Dr. Glockmann and Dr. Higurashi on chromosomal abnormalities developing during culture of human fibroblasts at the Canadian Society for Cell Biology in Montreal, June 1970. Dr. Crookston lectured on introduction to tissue transplantation to the Canadian Society of Laboratory Technologists Annual Convention, Toronto, June 30, 1969, on a new look at old blood groups to the Royal College of Physicians and Surgeons of Canada, Montreal, January 1970, and on normal haemostasis to the Refresher Course for Practising Pathologists, Division of Postgraduate Medical Education, Toronto, February 1970. With Mrs. M.C. Crookston, Miss K.L. Burnie and Dr. W.H. Francombe, Dr. Crookston reported on abnormalities of erythrocyte membrane in congenital dyserythropoietic anaemia at the International Congress of Clinical Pathology, Montreal, July 1969; with Mrs. M.C. Crookston and Dr. W.F. Rosse on red cell membrane abnormalities in hereditary erythroblastic multinuclearity at the American Society of Hematology, Cleveland, December 1969; with Dr. K.H. Shumak, Dr. B.S. Goldman and Dr. M.D. Silver on histological and immunological features of rejection in canine cardiac allografts to the Canadian Society for Clinical Investigation, Montreal, January 1970, and on antibodies in the serum and on the heart of dogs with cardiac allografts, with Dr. K.H. Shumak, Dr. B.S. Goldman, Dr. M.D. Silver, Dr. J. Cartier, and Dr. W.G. Bigelow, at the Clinical Research Society of Toronto, Toronto, May 1970. Dr. A. Katz spoke on microangiopathic hemolytic anaemia and malignant hypertension, with Dr. B. Garvey, at the Monthly Pathology Meeting, Toronto, April 1970. Dr. K. Miyai spoke on ultrastructural studies on the sinusoidal fat-storing cells for the liver at the Annual Meeting of the Canadian Association of Pathologists, St. John's, Newfoundland, June 1970, on the ultrastructural studies on the isolated perfused rat liver in acute ethionine intoxication at the Canadian Federation of Biological Societies in Montreal, June 1970, and on the effects of glucose on the fine structural changes in the liver cell at the 7th International Congress of Clinical Pathology, Montreal, July 1969. Dr. A.N. Raick reported on the reversal by glucose of the acute chemical changes induced by ethionine at the Federation of American Societies for Experimental Biology, Atlantic City, April 1970, on early ultrastructural and biochemical changes induced by croton oil fraction A in mouse skin at the American Association for Cancer Research, April 1970, and on the effects of 9,12-dimethylbenzanthracene and corn oil on mitoses in mouse liver after partial hepatectomy, at the Canadian Federation of Biological Societies, Montreal, June 1970. Dr. Movat spoke on the activation of the plasma kinin system by antigen-antibody aggregates – isolation and characterization of kinin-forming components at the Symposium on Kinins and Prostaglandins to the Canadian Physiological Society, Edmonton, June 1969, on the acute inflammatory reaction at the Graduate School M.D. and Ph.D. Program of the University of Wisconsin, Madison, June 1969, on the isolation and characterization of two kinin-forming enzymes and other active components from human and animal plasma, at the Fourth International Congress on Pharmacology, Basel, July 1969; on the isolation and partial characterization of kinin-forming enzymes and other active components from human plasma, at the International Symposium on Cardiovascular and Neuro-Actions of Bradykinin and Related Kinins, Florence, July 1969, on PMN-leukocyte lysosomes and vascular injury at the Symposium on Vascular Factors and Thrombosis, Bath, England, October 1969, and on the acute inflammatory reaction, at the Department of Pathology, University of Manitoba, Winnipeg, November 1969. Dr. M.J. Phillips reported on the ultrastructural and certain biochemical aspects of glycogen metabolism to the meeting of the American Association of Pathologists and Bacteriologists, St. Louis, May 1970, on ultrastructural hepatocellular alterations induced by fructose, to the American Gastroenterological Association in Boston, May 1970, and

organized seminars on the interpretation of human liver biopsies at McMaster University, Hamilton, May 1970.

Dr. Pantalony and Dr. Sekeguchi spoke on screening for haemostatic abnormality at the Refresher Course for practising pathologists, Toronto, February 1970, on diseases of blood to dental students, March 1970; on hereditary and acquired haemolytic anaemias at the Toronto Institute of Medical Technology, Toronto, February 1970; the transfusion of whole blood and its components and transfusion reactions at the Toronto Institute of Medical Technology, Toronto, March 1970, and review of haematological morphology to the Advanced Graduate Course, Division of Postgraduate Medical Education, Toronto, July 1970. Dr. P. Sadowski reported on bacteriophage T4-induced nucleases involved in degradation of bacterial DNA to the Toronto Biochemical and Biophysical Society, Toronto, 1970, and on bacteriophage T7-induced breakdown of *Escherichia coli* DNA at the Federation of American Societies of Experimental Biology, Atlantic City, April 1970. Dr. M.D. Silver spoke on special histological techniques used to study heart disease, to the 33rd Annual Convention of the Canadian Society of Laboratory Technologists, Toronto, July 1969; on a new classification of mitral valve chordae tendineae to the Ontario Association of Pathologists, London, October 1969, on a reassessment of mitral valve anatomy and its significance in prolapsed posterior leaflet, to the 67th Annual Meeting of the American Association of Pathologists and Bacteriologists, St. Louis, March 1970, and Mr. J. Lam spoke on reassessment of mitral valve anatomy and its significance in prolapsed posterior leaflet to the 22nd Canadian Cardiovascular Society Meeting in Quebec City October, 1969. Dr. Simon, with Dr. Y. Bédard and Dr. P. Pinkerton, reported on the absorption of iron by the mouse duodenum. Electron microscopic study, to the 12th Annual Meeting of the Canadian Federation of Biological Societies, Edmonton, June 1969, with Dr. J.S. Burke on the phagocytosis of colloidal carbon in the rabbit spleen, also at the meeting of the Canadian Federation of Biological Societies in Edmonton, June 1969, and on erythroleucophagocytosis of the spleen at the 7th International Congress of Clinical Pathology, Montreal, July 1969. Dr. D.W. Thompson was Guest Lecturer and guest panelist at the International Tutorial on Hormonal Cytology, University of Chicago, August 1969; Guest Lecturer and guest panelist at the Postgraduate Course in Cytology, Johns Hopkins University, Baltimore, August 1969; Guest Lecturer on Cytology, Ottawa Civil Hospital, Ottawa, October 1969; Guest Lecturer, cog Travel Club, April 1970; Guest Panelist, Federation of Societies of Clinical Laboratory Sciences of New York State, Syracuse, May 1970, and Guest Panelist, Society of Obstetricians and Gynaecologists of Canada, Jasper, June 1969. Dr. Young gave an address on technologist training in Ontario to the Canadian Society of Laboratory Technologists, Toronto, July 1969; was Moderator of a Panel on trends in laboratory medicine at the VIIth International Congress of Clinical Pathology, Montreal, July 1969; took part in discussions on the application of technologies to the applied arts, National Communicable Diseases Centre, Atlanta, October 1969; gave an address on the biological basis for organizational chaos in the applied arts, to the Canadian Chapter, American Society for Cybernetics, November, 1969; on community organization for medical laboratory work, at a Hartford Hospital Pathology Conference, Hartford, November 1969; on the medical laboratory situation, or the problem of heading off a runaway, at a meeting of the Connecticut Association of Pathologists, New Haven, November 1969; on the biological basis for organizational chaos in the applied arts – health and education – with some thoughts bearing upon remedial action, Yale University Conference, Department of Laboratory Medicine, New Haven, November 1969; on principles essential to the process of effective reassurance with reflections on multiphasic screening in Birmingham, Alabama, Alabama Medical School, January 1970. Drs. Bouchard, Humphrey and Rewcastle presented a paper on muscle fibre types in normal human skeletal muscle and certain neuromuscular disorders at the Toronto Society for Clinical Investigation, May 1970; Dr. Rewcastle took part in the Long Course of the International Academy of Pathology on pathological physiology and anatomy

of the striated muscle, St. Louis, March 1970; Drs. Becker, Rewcastle, Gadjusek and Richardson presented a paper on subacute spongiform encephalopathy (Creutzfeldt-Jakob Disease), at the 5th Canadian Congress of Neurological Sciences, Toronto, June 1970; Drs. Wherrett and Rewcastle presented a paper on cerebral lipidosis of late onset at the 5th Canadian Congress of Neurological Sciences, Toronto, June 1970; Dr. J. Deck presented a paper on subacute spongiform encephalopathy at the meeting of the Canadian Association of Neuropathologists, Halifax, October 1969; Dr. Rewcastle spoke on cytomegalovirus encephalitis in the adult at the meeting of the Canadian Association of Neuropathologists, Halifax, October 1969, and Dr. M. Platts reported on metastasizing medullo-blastoma, at the Canadian Association of Neuropathologists, Halifax, October 1969.

PUBLICATIONS

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- ARMSTRONG, R.M. (with Hanson, P.A.) "Distal Muscle Wasting, Nephritis and Deafness" (*Neurology*, vol. 20, May 1970, p. 426).
- BHAGWAT, A.G. "Hepatic Reaction to Nitrofurantoin" (*Lancet*, vol. II, no. 7634, 1969, p. 1369).
- BHAGWAT, A.G. and CONEN, P.E. "Characterization of 'Free Alveolar Cells' (FAC) in Experimental Adjuvant Induced Pneumonia (EAIP)" (*Archives of Pathology*, vol. 88, July 1969, pp. 21-9).
- CONEN, P.E. (with Bell, C.D.) "Histochemical Fibre 'Types' in Duchenne Muscular Dystrophy" (*Journal of Neurological Science*, vol. 10, 1970, pp. 163-71).
- CONEN, P.E. (with Hampole, M.K. and Thomson, H.G.) "Chromosome Abnormalities in Patients with Syndactyly" (*Canadian Medical Association Journal*, vol. 101, Nov. 15, 1969, pp. 597-600).
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- EZRIN, C. (with Bain, J.) "Immunofluorescent Localization of the LH Cell of the Human Adenohypophysis" (*Journal of Clinical Endocrinology*, vol. 30, Feb. 1970, pp. 181-4).
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PHARMACOLOGY

Under the direction of Professor W. Kalow

Teaching activities in the department changed in several respects during the past year. The students who entered Medicine in the Fall of 1968 received a specially prepared, condensed course in Pharmacology between September and December 1969, to enable them to start Period IIA in January 1970. This condensed course was organized by Professor W.H.E. Roschlau. The students who entered Medicine in the Fall of 1969 were the first group to be instructed under the new curriculum. Their first exposure to pharmacological problems occurred in the second half of their academic year in the context of instructions on the Nervous and Cardiovascular Systems. These latter instructions, plus the earlier efforts for the condensed course, meant an increased load for the teaching staff. Nevertheless, there were additional, new teaching commitments. First, a full Pharmacology course consisting of lectures, demonstrations, and discussions, was organized by Professor J. Talesnik and presented for the first time to students of the Faculty of Arts and Science. Professor P. Seeman designed a new and original course on drug interaction with biological membranes. It is hoped that this is the first step towards the development of a series of specialist courses of inter-disciplinary interest. As in previous years, Professor H. Kalant organized the course in Advanced Pharmacology. In addition, in his capacity as Chairman of the Nervous System Committee, he gave much of his energy to the development of a new teaching programme for this committee. As before, Professor F.A. Sunahara took responsibility for the Pharmacology course to Dental students. Professor G.E. Johnson organized the course to Pharmacy students, and Professor A.K. Sen the departmental seminars.

For nearly half a year, Dr. H. Machleidt joined the department as a Visiting Professor. Professor Machleidt is Director of Research in Medicinal Chemistry of the pharmaceutical company "Dr. Karl Thomae," and Professor of Chemistry at the University of Tübingen in Germany. Professor Machleidt contributed to the activities in this department, particularly with his modern lecture series on the relationship between chemical structure, physical parameters, and biological activity of drugs.

During the year, the graduate students of the department were encouraged to form a Union, which immediately submitted constructive proposals which should improve life and learning in the department. A staff-student liaison committee was formed to present a forum for continued discussion. Student representatives were invited to attend the meetings of the academic staff. The report of the Committee on University

Government and the deliberations of the *Ad Hoc* Committee on Decision Making in the Faculty of Medicine were intensely discussed at staff meetings.

During the year, we received with regret the resignation of Professor Paul Cooper who will join the University of Montreal. He will be replaced by Professor Carleton Hsia, who left the National Research Council in Ottawa in order to join this Department. We also welcomed Professor Yedy Israel, a former graduate of this University, who came to us from the University of Santiago de Chile. Professor Gordon Johnson resumed his activities after a leave-of-absence in Basle, Switzerland.

The department is able to maintain its Summer Student Programme with help from the Research Board of the University, the Medical Research Council, and contributions from the pharmaceutical houses, Geigy (Canada) Limited, Burroughs Wellcome & Co. (Canada) Ltd., and Ciba Company Limited. These contributions are most gratefully acknowledged. An exchange programme for selected graduate students between this department and the Rudolf Magnus Institute for Pharmacology of the University of Utrecht, Netherlands, will bring two Dutch students here for the summer.

Graduate students have completed the following theses: for the Ph.D. degree – Thomas A. Pugsley, "Studies of Metaraminol as a Possible False Transmitter"; Thomas Tobin, "On the Mechanism of the Ouabain Inhibition of the $(\text{Na}^+ + \text{K}^+) \text{ATPase}$."

For the M.Sc. degree – Frank Pallares, "The Effect of Different Degrees of Activity of the Thyroid Gland of Rats on the Possible Development of Immune Experimental Thyroiditis"; Sheldon H. Roth, "The Membrane Concentrations of Alcohol Anesthetics."

VISITORS

Dr. J.R. Gillette, Head, Section of Drug Metabolism, National Heart Institute, Bethesda, Maryland; Dr. J.F. Hoffman, Department of Physiology, Yale University School of Medicine, New Haven, Connecticut; Dr. S. Brimjoin, Department of Health, Education and Welfare, National Institute of Mental Health, Bethesda, Maryland; Dr. F.C. MacIntosh, Department of Physiology, McGill University, Montreal, Quebec; Dr. M. Feinstein, Department of Pharmacology, University of Connecticut Health Center, Farmingdale, Connecticut; Dr. C.M. Smith, Professor and Chairman, Department of Pharmacology, State University of New York at Buffalo, Buffalo, N.Y.; Dr. D. de Wied, Professor and Chairman, Rudolf Magnus Institute for Pharmacology, University of Utrecht, The Netherlands.

RESEARCH

In the section of Professor W. Kalow, the study of malignant hyperthermia continued. A statistical analysis of case reports by Dr. B.A. Britt, with the help of Professor L. Endrenyi, indicated an association between the rigidity which characterizes most cases of this rare complication of anaesthesia, and certain forms of musculo-skeletal disease. Dr. J. Brebner defined interactions between some human tissue esterases and analgesic drugs. Mr. D. Bailey found some surprising relationships between electrolytes and uptake of chlorpromazine into cell membranes.

An analytical laboratory was established in the department during the past year. This facility, under the joint direction of Professors Kalow and Johnson, is designed to meet the increasing demand for information concerning the absorption, distribution, metabolism, and excretion of drugs, and is well equipped to measure levels of most drugs or their metabolites in biological material. This laboratory will undertake research into areas where there is a need to compare the levels of a drug in blood, urine, or tissues with the pharmacological effects of that drug. Furthermore, investigations into the basic mechanism of drug metabolism have been started by Professor C. Hsia who has recently joined the group. Dr. Hsia is utilizing electron spin resonance techniques to study initially the binding of cytochrome P450 to microsomes. This cytochrome is involved in most drug oxidation reactions. It is hoped to learn how it facilitates the

oxidation of a wide variety of drugs. Professor Endrenyi is providing for the mathematical and statistical calculations which the analytical laboratory requires.

A principal interest in Professor E.A. Sellers's section is in the control and actions of the thyroid. Dr. K.V. Flattery, Dr. A.G. Awad, Mr. Andrew Shum, and Dr. Sellers have continued an investigation on the effects of altered thyroid function and exposure to cold on the metabolism of catecholamines. It has been shown that thyroid activity affects the synthesis and secretion of norepinephrine. By using radioactive labels it is possible to measure the altered metabolic patterns in detail, and this investigation is proceeding actively.

Dr. Flattery has collaborated with Dr. G. Sereny of the Alcohol and Drug Addiction Research Foundation in studying the effects of alcohol on the secretory activity of the adrenal medullae and on lipid metabolism in humans.

Professor E. Schönbaum has worked with Professor Desbarats-Schönbaum in examining the concentrations of propylthiouracil necessary to inhibit synthesis of thyroxine *in vitro* and *in vivo*. They are also studying the action of thyrotrophin on separate stages of the process of synthesis and release of thyroid hormones.

Dr. J.H. van Maanen and Mrs. Gail Pirie Pogoriler have produced antibodies to thyroglobulin which bind thyroxine firmly. The effects of altered metabolic status on the production of these antibodies has received attention.

Mr. I.M. MacDonald and Professor Sellers are collaborating with Drs. Calvin Ezrin, M.E. MacRae, L. Goluboff, and I. Stratman (Department of Pathology) in a study in which the nuclei of cells in the anterior pituitary are labelled with thymidine. The object of this work is to label cells at rest and under stimulation to produce thyrotrophin.

The work of the addiction research group, under the direction of Professor H. Kalant and Professor J.M. Khanna, has been extended into new areas in relation to alcohols, barbiturates, minor tranquillizers, and other drugs. An intensive effort was made to clarify the metabolic interrelation between alcohol metabolism and drug metabolism in the liver. Work done with Dr. J. Marshman, using a wide variety of techniques including *in vivo* metabolic studies, incubated tissue slices, and isolated enzyme systems, has shown clearly that alcohol and barbiturates do *not* share common metabolic pathways in the living subject, and that chronic treatment with one does not affect metabolism of the other. The shared pathway in liver microsomes, reported by others, is an artefact of *in vitro* technique, and is due to catalase activity in the microsomes.

In other metabolic studies with Mr. G. Bustos, the computer model developed last year was used to analyse the data on turnover of C¹⁴-labelled fatty acid in liver lipids. Chronic ethanol treatment was found to produce fatty liver by decreasing the oxidation of fatty acids, increasing their esterification to triglycerides, and increasing both the secretion of lipoprotein into the plasma and the storage of triglyceride as fat droplets within the cell. In contrast, by the use of pyrazole to block alcohol metabolism, the acute alcoholic fatty liver was found to depend primarily on increased mobilization of fatty acids to the liver.

Mr. D. Haist completed his isolation of rat liver alcohol dehydrogenase, achieving a 200-fold purification. Careful study of the kinetics of the purified preparations showed that enzymes from the livers of animals chronically treated with alcohol and from control animals were the same. This indicates that the increase in alcohol-metabolizing capacity may be a true enzyme induction. In contrast, other experiments have revealed that chronic alcohol treatment does not cause adaptive changes in the mitochondrial oxidation of NADH, but does seem to alter the ratio of oxidized and reduced NADP.

Other work with Mr. A.E. LeBlanc, jointly with Dr. R.J. Gibbins of the Addiction Research Foundation, has made rapid progress in clarifying the nature of alcohol tolerance and physical dependence in the central nervous system. A new method has been developed for measuring withdrawal reactions in rats, and it has been shown that tolerance and dependence develop simultaneously. Their rate of development

can be greatly increased by forced activity under the influence of alcohol, and can be prevented by cycloheximide or by ablation of parts of the cerebral cortex. These findings have given rise to a broad and fundamental theory to explain physical dependence on depressant drugs, which is currently being developed in relation to a major review of the relevant scientific literature.

The biochemical basis of this tolerance has been explored further in studies on the effect of alcohol on purified adenosine triphosphatase from rat brain, and in collaborative studies with Professor Y. Israel of the University of Chile, on ATPase activity and ion transport in brain slices of alcohol-tolerant animals, and blood cells of human alcoholics. Professor Israel has now joined the staff of this department, and will extend the work further here.

Dr. M. Willinsky, in collaboration with Dr. C. Webster of the Addiction Research Foundation, has continued a study of the effect of tetrahydrocannabinol, amphetamine, and mescaline on discriminative avoidance behaviour in rats, in order to develop appropriate dose-response functions for studying the possibility of tolerance to cannabis.

Dr. K.J. Ryan successfully completed a study of the chemical, enzymatic, and electrostatic properties of synaptic vesicles and synaptosomes from guinea-pig brain. This work has yielded a new method of isolating these particles, and has provided the basis for a new theory concerning the first step in the release of acetylcholine at nerve endings.

The research activities of Professor E. Llewellyn-Thomas will be incorporated into the report of the Institute of Bio-Medical Electronics.

In Professor D.M. Derry's laboratory, research continues on the function of brown fat. Early studies showed that the brown adipose tissue of rats contains two sympathetic nerve supplies. As a follow-up to this study further work was done on the development of sympathetic nerve fibres in the interscapular brown adipose tissue of the newborn rat. It was found (1) that the parenchymal nerve supply arrived at the individual fat cells via a different route from the arterial nerve supply, and (2) that in the newborn rat the sympathetic nerves, although present, did not contain any catecholamines and, also, the brown adipose tissue cells contain very little, if any, lipid. It was thought possible that the brown adipose tissue in the newborn rat was either not functioning or was not functional in the same way as in the adult rat. It is known, through the work in this section, that the most striking difference between the brown adipose tissue and white adipose tissue of the rat is in its sympathetic nerve supply. Further work is being carried on now to find if it is possible for brown adipose tissue to turn into white adipose tissue or vice versa and to study the effects of the classical adrenergic drugs upon the brown adipose tissue.

Professor L. Endrenyi has been studying the estimation of hyperbolic rate and binding function parameters in computer simulated experiments. The accuracy and precision of the estimates depend very strongly on the observable behaviour of the experimental error, on controllable experimental conditions, including the number of experiments and the range and spacing of the (total) concentration, and on the method of evaluation. Use of the so-called Scatchard-plot, c_f/c_b vs. c_f (the indices b and f refer to the bound and unbound, free substrate concentrations, respectively), or of its inverted form is recommended when the experimental error is independent of the concentration. Under such conditions $c_b/c_{b,\max}$ should not be less than 0.4. The inverted Scatchard-plot provides the best results also when the error is proportional to c_f , but only if the scaling of the total concentration is harmonic.

In co-operation with Dr. J.T. Wong (Department of Biochemistry), features of non-hyperbolic rate and binding functions have been investigated. Steady-state and quasi-equilibrium predictions of various model mechanisms have been analysed which make possible the differentiation among these mechanisms. The properties of second-degree functions have been studied in detail and methods have been devised for their identification. These include nomograms either of the type of the Scatchard-plot or others relating the extreme value of the Hill-slope to ratios of concentrations which give rise to some given fractional velocities (or fractional bindings). Also a linear plot

has been developed, which tests for the validity of mechanisms involving concerted allosteric transitions and estimates the conformational equilibrium constant and the degree of the rate or binding function.

Under the direction of Professor C.H. Hockman, research has been continued on central nervous mechanisms which play a role in the regulation and/or modification of autonomic function. In collaboration with Dr. J. Talesnik and Dr. K.E. Livingston, it has been shown that limbic midbrain-forebrain structures can exert either a facilitatory or inhibitory influence on reflex vagal bradycardia, a brainstem baroreceptor reflex. In subsequent work, it has been shown that carotid sinus nerve afferents project to the limbic regions that participate in modulation of the cardiac reflex.

It is believed that the intimate relationships between the midbrain and forebrain areas are such as to suggest a widespread limbic modulatory influence on all brain stem reflexes. This hypothesis is now being tested. The elucidation of such mechanisms is of paramount importance in any assessment of drug effects on CNS control of autonomic function.

In another study with adult human subjects, an assessment is being made of the effects of ethanol and other psychotropic compounds on different components of the cortical potential evoked by auditory stimuli. These responses are picked up from scalp electrodes, suitably amplified, and processed on a special-purpose computer. Data collected to date indicate that certain components of the evoked response can be significantly altered by the administration of drugs.

Dr. R.G. Perrin and Dr. Hockman are studying cats over extended periods of time in different behavioural situations, by electrodes stereotaxically placed and fixed in specific regions of the brain of the cat. This technique permits a detailed study of the effects of psychotropic compounds on electrical activity recorded from cortical and subcortical loci in the freely-moving animal.

In the section of Psychopharmacology, under the direction of Professor O. Hornykiewicz, the following research projects have been pursued and partly completed: (a) "Behavioural effects of L-Dopa and threo-Dops in mice in relation to their metabolism in different brain areas." It has been shown that dopamine formed from L-Dopa accumulates preferentially in the striatum whereas other L-Dopa metabolites (noradrenaline, 3-methoxy-dopa) have a wider distribution in the brain. The increase of dopamine concentration in the striatum can be correlated with L-Dopa's pharmacological action, i.e., induction of locomotor hyperactivity. (b) "Enzymology and biochemistry of the basal ganglia in human brain." So far the regional distribution of L-Dopa decarboxylase in the human brain has been studied. It could be shown that the activity of this enzyme is greatly diminished in Parkinsonism. (c) "Actions of centrally acting cholinergic and adrenergic drugs on the medullary vasomotor centres." Cholinergic drugs increase the blood pressure by a central mechanism of action. Reserpine abolishes this effect. The possible role of catecholamines in the functioning of vasomotor centres is being studied.

In Professor G.E. Johnson's section during the past year, research has proceeded along the following lines. Investigations into the formation, storage, release, and inactivation of noradrenaline have continued. Evidence has been obtained suggesting that the rate of noradrenaline synthesis may not be entirely dependent on the rate of its secretion. Rats treated with the ganglionic blocker, mecamylamine, and placed at 15° C showed a fall in noradrenaline secretion but an increase in noradrenaline synthesis. Research into the possibility that foreign compounds, similar in structure to noradrenaline, may replace noradrenaline within sympathetic nerves was concluded this year. This work on "false transmitters," which was conducted over a period of four years, demonstrated that metaraminol, a chemical structurally similar to noradrenaline is synthesized from administered alpha-methyl-m-tyrosine within sympathetic nerves along biosynthetic pathways normally producing noradrenaline. Metaraminol replaces much of the noradrenaline normally bound within the sympathetic nerves and its rate of synthesis and release is increased during sympathetic stimulation. Inhibition of noradrenaline synthesis increases the rate of metaraminol formation.

However, in spite of these obvious interactions between noradrenaline and metaraminol evidence was produced to show that metaraminol does not depress the secretion of noradrenaline. It is obvious, therefore, that metaraminol does not replace the small important physiologically releasable store of noradrenaline.

A second area of research was opened up during the past year into the metabolism of drugs. Several projects were begun. These include studies on the antibiotic, doxycycline; the anti-hypertensive, reserpine; and the narcotic, morphine.

The research activities of Professor W.A. Mahon are reported by the Department of Medicine.

Under the supervision of Professor W.H.E. Roschlau, research is directed towards the study of fibrinolytic agents. In collaboration with the Connaught Medical Research Laboratories of the University, the enzyme Brinase (CA-7 Connaught), which is the subject of continued investigation in this laboratory, is used as a model drug to help in understanding the effects of these enzymes on (a) blood platelets and (b) plasma proteins. (a) The modification of platelet aggregation and adhesiveness by fibrinolytic enzymes is studied both *in vitro* and *in vivo*, using techniques of investigation developed especially for this purpose. Preliminary results indicate a profound inhibition by Brinase of these platelet reactions in a variety of species, including man. Clinical application of these drug effects is envisaged in thrombosis prophylaxis and therapy. (b) Plasma proteins were found to be capable of releasing vasodepressor substances when subjected to fibrinolytic enzyme action. The activation of such substances, presumably kinins, and their identification are attempted by means of column chromatography and bioassay.

In Professor P. Seeman's section the following research has been pursued. The Overton-Meyer theory of anaesthesia (stated in 1899) predicted that when 50 per cent of the subjects are anaesthetized by any anaesthetic, the concentration of anaesthetic molecules in the excitable membranes should be approximately 0.04 moles of anaesthetic per kilogram of cell membrane. With Mr. S. Roth it has been proved experimentally that this prediction is correct. Some inadequacies of the classical theory were revealed by this work, however, and a new theory of anaesthesia (called the "Free Energy Theory of Anaesthesia") has been developed in close collaboration with Dr. H. Schneider of the National Research Council, Ottawa.

Miss M. Chau has discovered that chemicals such as ethanol, glue solvents, and volatile anaesthetics, can increase the concentration of calcium ions associated with the membrane. This finding does much to explain how these compounds sensitize and excite tissues, and may lead to therapeutic advances.

Dr. W. Kwant recently resolved the problem of whether tranquilizers have a special selectivity for certain regions of the brain or whether the blood-brain barrier controls the precise distribution of the tranquillizer. He found the latter to be correct.

Working with Mr. W. Thorpe, Dr. Seeman is currently trying to understand how denervated muscles become supersensitive to acetylcholine.

Under the direction of Professor A. K. Sen a study of the mechanism of inhibition of the transport enzyme, $(\text{Na}^+ + \text{K}^+)\text{-ATPase}$ by the cardiac glycoside, ouabain, has been completed. The study of the thiol-reacting diuretic and non-diuretic on the enzyme is progressing satisfactorily. The mechanism of ethacrynic acid inhibition of this enzyme has been worked out. Work on the mechanism of action of the non-diuretic sulfhydryl reagent, N-ethyl-maleimide (NEM), is also progressing satisfactorily. The results support the conformational-change hypothesis postulated by Dr. Sen and reported in a previous publication. The study on the mechanism of action of aldosterone on this enzyme system is progressing slowly. Another study of the purification of this enzyme is in progress.

In Professor L. Spero's section three membrane systems are currently under study since it is known that fluorescent hydrophobic probes (e.g., 1-anilino-8-naphthalene sulphonate) are "reporter molecules" which monitor the dielectric constant (hydrophobicity) of their microenvironment. Using these probes, one can study conformational changes induced in membrane systems if those changes involve alteration of the

hydrophobic nature of the probe binding site. (1) Na/K activated ATPase: in the presence of magnesium, which itself produces a large conformation change, addition of sodium and potassium to the membrane bound enzyme (phosphorylation) produces a conformation change which can be reversed by the addition of potassium (dephosphorylation). The characteristics of this conformation change are being determined in order to correlate it with the observed biochemical changes which occur in this system. (2) Interaction of local anaesthetics and alcohols with erythrocyte membrane: a correlation between membrane conformation and protection against hypotonic haemolysis has been observed. (This correlates well with local anaesthesia.) The phase within the membrane which the local anaesthetics are affecting, and the phase to which the probe is binding (an important and outstanding problem in this field) are being studied. (3) Hydrophobic probe study of the plasma membrane of the guinea pig ileum smooth muscle: a method has been developed for isolating this membrane, and it is hoped to improve on the procedure. The interaction of drugs which are assumed to induce conformation changes in membrane bound "receptors," and the interaction of various cations with the membrane have been studied. This technique has proved useful in the study of drugs which influence membrane permeability or which compete with cations for binding to the membrane.

The investigation into the mechanism of prostaglandin (PG) in the vascular system has been continued in Professor Sunahara's laboratory. In two series of studies: (a) prostaglandins clearance via the lung was found to be similar in the hypertensive and control rats even though the sensitivity to prostaglandin seems to be much greater in the hypertensive rats. Further studies indicate that this phenomenon may not be specific for PG. (b) In *in vitro* studies, radioactive R_b^{86} efflux from vascular tissue and mechanical changes were investigated in the presence of vasoactive substances. Both prostaglandin and noradrenaline cause an increase in the relative R_b efflux, even though PG relaxes and noradrenaline constricts this tissue. This paradox is being investigated.

Bioassay screening for vasoactivity was carried out as part of a training programme for Dr. S. Bamgbose from the University of Ibadan, Nigeria (sponsored by the Canadian International Development Agency). This was a collaborative study with Professor S. McLean (Department of Chemistry) on the extraction and purification of an alkaloid from an African plant, *Nuclea Diderichii*.

The pharmacological effects of a new anticholinergic agent, pentapiperide methylsulphate, were investigated in a collaborative study with Dr. F. Herr, Ayerst Laboratories, Montreal. This compound has very potent antispasmodic and antiulcerogenic effects which can be attributed to its postganglionic, anticholinergic effect.

A joint project with Professor J. Talesnik on the pharmacology of the coronary vessels is reported under Dr. Talesnik's section.

This is the first year that Professor J. Talesnik has been with the department as a permanent staff member. Most of the year has been taken up in organizing the research laboratory. A collaborative project has been initiated with Dr. Sunahara on the investigation of the mechanisms of coronary blood flow adaptation to changes in heart activity. Interest is directed towards the relationship that seems to exist between the metabolic events in the heart and the subsequent changes in coronary flow that are encountered. Drugs which affect the myocardial performance are included in this project.

Studies on the modulation of baroreceptor reflexes have been continued in collaborative work with Dr. C.H. Hockman and Dr. K.V. Livingston – these are included in Professor Hockman's report.

With Mr. F. Hart, Professor T.T. Zsoter continued research on the effect of thiazides and related diuretics on the blood vessels. Chlorthalidone was found to have a similar effect to benzothiazides, namely an inhibition of norepinephrine induced constriction in the arteries and veins after prolonged administration. No such effect was found with furosemide. The experiments, in co-operation with Dr. I. Radde (Research Institute, Hospital for Sick Children and Department of Pharmacology), have been expanded by comparing results with electrolyte contents of the vessels.

Studies on the effect of hypercapnia on response to various vasoactive drugs were concluded. In the Toronto Western Hospital, the effect of various extensively used drugs on venomotor baroreceptor reflexes were studied. Evaluation of a new anti-hypertensive drug, Catapres, was concluded. In association with Dr. Beanlands (Toronto Western Hospital and Department of Medicine) the efficacy of MJ 1999 in the treatment of angina pectoris will be compared with another beta blocking drug, propranolol, in a double blind study.

Professor P.D. Cooper continued research in structure-activity relations among psychotomimetic drugs.

HONOURS

DR. O. HORNYKIEWICZ, the Research Medal ("Meritorious Award") for 1969 of the American Association for Research in Nervous and Mental Disease; the first Gold Medal for research in Parkinsonism by the Canadian Parkinson's Disease Association.

PROFESSOR M.-L. DESBARATS-SCHÖNBAUM, Doctor of Natural Science by the University of Utrecht, Netherlands.

SCHOLARLY ADDRESSES

L. ENDRENYI, "The Effect of Plasma Protein Binding on Observed Rates of Drug Elimination," 4th International Congress of Pharmacology, Basle, Switzerland, July 15, 1969; "Simple, Accurate and Precise Estimation of Michelis-Menten Parameters," American Chemical Society, 158th National Meeting, New York, N.Y., September 8, 1969.

O. HORNYKIEWICZ, "Pharmacology and Pathophysiology of Dopamine Neurons," First International Symposium on Cell Biology and Cytopharmacology, Venice, Italy, July 1969; "The Metabolism of Brain Dopamine in Human Parkinsonism," Second International Meeting of the International Society for Neurochemistry, Milan, Italy, September 1969; "Monoamines and Parkinsonism," Symposium on Parkinsonism and L-Dopa, 9th International Congress of Neurology, New York, N.Y., September 1969; "How does L-Dopa work in Parkinsonism," Laurentian Research Conference on L-Dopa, November 1969; "Control by Substantia Nigra of Biogenic Amine Metabolism in the Striatum," Symposium on Substantia Nigra and Sensimotor Activities, Newark, N.J., December 1969.

H. KALANT, *et al.* "Training under the Influence of Ethanol as a Factor in the Development of Tolerance and Physical Dependence in the Rat," 32nd Annual Conference of the Committee on Problems of Drug Dependence, National Academy of Sciences, National Research Council, Washington, D.C., February 1970.

W. KALOW, "Current Aspects of Pharmacogenetics," Institute for Pharmacology, University of Milan, Milan, Italy, January 1970; "Hyperpyrexia and Hyperrigidity in Anaesthesia," International Workshop on Pharmacogenetics in Titisee, Germany, March 1970; "Quantitative Changes of Drug Response," Symposium on Pharmacogenetics, Canadian Society of Chemotherapy, 6th Annual Meeting, Quebec City, May 1970; "Pharmacogenetics," Symposium on Adverse Drug Reactions, Annual Meeting of the American Medical Association, Chicago, Ill., June 1970; "Topics in Pharmacogenetics," Conference on Drug Metabolism in Man, New York Academy of Sciences, New York, N.Y., June 1970.

J.M. KHANNA and H. KALANT, "Metabolic Interactions of Ethanol and Drugs," Symposium on Alcohol and Metabolism, Baylor University, Houston, Texas, November 1969.

W.H.E. ROSCHLAU, "Brinase (CA-7) – a New Fibrinolytic Agent," Quebec Coagulation Conference, University of Sherbrooke, Sherbrooke, P.Q., April 28–30, 1970.

E.A. SELLERS, "Activity of the Sympathetic Nervous System during Cold Exposure," Symposium on Non-Shivering Thermogenesis, Prague, Czechoslovakia, April 1970.

A.K. SEN, "A Cycle of Ouabain Inhibition of ($\text{Na}^+ + \text{K}^+$)-dependent ATPase," Department of Pharmacology, University of Alberta, Edmonton, Alta.

L. SPERO, "The Importance of Cell-Cell Junctional Coupling in the Activation of a Synchronous Contraction of Smooth Muscle," Medical College of Ohio at Toledo, July 2, 1969; "The Use of Fluorescent Hydrophobic Probes in the Study of Membrane Conformation," National Research Council, Ottawa, Ont., May 26, 1970.

F.A. SUNAHARA, "Interaction of Prostaglandin and Other Vasoactive Agents," 4th International Congress on Pharmacology, Basle, Switzerland, July 1969.

T.T. ZSOTER, "The Effect of Benzothiadiazides on Veins," 4th International Congress on Pharmacology, Basle, Switzerland, July 1969.

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PHYSIOLOGY

Under the direction of Professor R.E. Haist

The past year has produced many changes and required many adjustments. The changes in the Medical curriculum along with the changes in the courses in Arts and Science have meant that a great amount of time and effort has gone into organization. Such a large amount of energy has been spent in committee work by such a large segment of the staff that one becomes seriously concerned about the effects on research and scholarly activity if the trend continues. It is hoped that the extensive involvement will be temporary, but the tendency throughout the whole University seems to be towards a greater participation in those activities, which neither directly enhance knowledge nor instruct the young.

Despite these distractions the teaching commitments are well discharged and the research activity is still good.

In the various courses given by the department 2,257 students were taught, 908 of these in laboratory courses. There are in addition 45 graduate students, of whom 19 are proceeding to the Ph.D. degree. A graduate course in cardiovascular physiology was introduced this year.

Dr. J. Hunter has given special help in the development of visual aids for teaching and Dr. J. Blumenstein, a cross-appointee from Mount Sinai Hospital and the Division of Educational Affairs, undertook an ambitious experiment in audiovisual presentation of physiology to the classes in Physical and Occupational Therapy.

The department was pleased to welcome two outstanding new members of staff during this year. Last August Dr. Peter Hallett from the University of Alberta at Edmonton joined the department. His special field is the physiology of vision. More recently Dr. John Murphy from the State University of New York at Buffalo has joined the department and is setting up his laboratory in neurophysiology. Recently too Dr. J.A. Satterberg, cross-appointed from the Department of Psychology, is setting up a research laboratory in our neurophysiology section. It is encouraging to note that the department now has a strong, vigorous group in neurophysiology, special senses, and electrophysiology, as well as in cardiovascular-renal physiology, endocrinology, and integrative physiology, with improved coverage of gastrointestinal physiology and groups in blood and several other areas.

The group especially concerned with integrative physiology and isotope methodology will feel the loss of Professor G. Hetenyi who is leaving to become Chairman of the Department of Physiology at the University of Ottawa. Professor Hetenyi's lively and intelligent presence will be greatly missed.

A new cross-appointee, Professor R.C. Goode of the Ontario College of Education has strengthened our respiratory section. Another new cross-appointee with the Department of Medicine, Dr. G.G. Forstner, will bring a valuable contribution to the section of gastro-intestinal physiology.

We are grateful to a number of other honorary members of the department who have made important contributions to undergraduate and graduate teaching and to other work of the department: Dr. W.S. Hartroft, Dr. J. Martin, Dr. B.S.L. Kidd, Dr. D. Fraser, Dr. F. Coceani, Dr. S.W. Kooh, and Dr. L. Sutherland of the Hospital for Sick Children, Dr. W.H. Johnson and Dr. J.M. Fredrickson of the Department of Otolaryngology, Dr. R.J. Shephard of the Department of Physiological Hygiene, Dr. A.T. Storey of the Faculty of Dentistry, Dr. I. Fritz of the Banting and Best Department of Medical Research. The large teaching load of the department is only made tolerable because of the contributions of the honorary and cross-appointed members. That contribution is greatly appreciated.

Many distinguished scientists visited the department throughout the year. The following gave lectures or seminars: Dr. J. Murphy, State University of New York at Buffalo; Dr. Stevan Milkovic, University of Zagreb, Yugoslavia; Dr. H. Grundfest, College of Physicians & Surgeons of Columbia University; Dr. H. McLennan, University of British Columbia; Dr. P.J. Randle, University of Bristol, England; Dr. B.J. Sessle, National Institutes of Health, Bethesda; Dr. W.J.H. Nauta, Massachusetts Institute of Technology; Dr. P. Gloor, Montreal Neurological Institute; Dr. G. Melville Jones, McGill University; Dr. Georg von Békésy, University of Hawaii; Dr. N. Altszuler, New York University Medical Center. Ten of these were given under the Visiting Lecturers Programme of the School of Graduate Studies. One (Dr. Sessle) was given under the auspices of the Toronto Chapter of the International Association for Dental Research.

In addition, special lectures were given by the following members of the department: Dr. J. Grayson, Dr. I.B. Fritz, Dr. J.W. Pearce, Dr. H. Sonnenberg, Dr. F.C. Monkhouse, Dr. B.J. Lin, Dr. R.M. Preshaw, Dr. G.J. Hetenyi, Dr. M. Vranic, Dr. N. Forbath, Dr. O. Sirek. One seminar was given by Dr. J. Van Loon, Department of Geology.

A special series of neuroscience seminars was arranged for the department by Dr. F. Coceani. One important purpose was to bring together members of all parts of the University interested in neurosciences. Many members from different departments participated. They were: Dr. J.R. Wherrett, Department of Medicine; Dr. H. Atwood, Department of Zoology; Dr. P. Seeman, Department of Pharmacology; Drs. C.H. Hockman, K.E. Livingston, J. Talesnik, Department of Pharmacology; Dr. P.E. Hallett, Department of Physiology; Dr. A. Sen, Department of Pharmacology; Dr. B.H. Pomeranz, Department of Zoology; Dr. A.T. Storey, Faculty of Dentistry and Department of Physiology; Dr. D. Derry, Department of Pharmacology; Dr. D.R. Crapper, Department of Physiology; Dr. O. Hornykiewicz, Department of Pharmacology; Dr. J. Fredrickson, Departments of Otolaryngology and Physiology; Dr. L.W. Organ, Department of Physiology; Dr. W.H. Johnson, Departments of Otolaryngology and Physiology.

RESEARCH

A summary of the research activity of the department follows.

In Professor R.E. Haist's section, Dr. B.J. Lin has investigated factors influencing the synthesis of proinsulin and insulin, along with the metabolism of various substrates in isolated islets of Langerhans, and with Dr. R. Kajioka he has been attempting to obtain a cell-free system for insulin synthesis. Mr. A. Sun, with Professor M.A. Ashworth has been investigating the effects of partial removal of the pancreas and relating the observed changes to residual islet volume. Mrs. J. Coddling and Mrs. M. Merriees have been studying effects of various procedures on plasma, immunoreactive insulin levels, and the effects of serum factors and other substances on some actions of insulin on muscle. With Dr. A.M. Rappaport, Dr. J. Hunter and several other groups, effects of various procedures on the secretion of immunoreactive insulin have been carried out.

In Professor J. Campbell's section, Dr. K.S. Rastogi, with Mr. G.R. Green, has studied effects of growth hormone, glucocorticoids, and other factors on insulin formation. Dr. J. Pierluissi, with Mrs. Lazdins, investigated the effects of growth hormone and glucagon on insulin secretion *in vivo* and *in vitro*. Mr. S. Koziak has been studying the species specificity of growth hormone.

Professor D.W. Clarke's section has continued work on factors affecting carbohydrate utilization and fat synthesis in isolated brain slices and measurement of dielectric constants of tissues has been initiated.

In Professor D.R. Crapper's section, work on the relation of microtubules to the electrical activity of neurons continues in both vertebrate and invertebrate preparations. The influence of neurofibrillary tangles on short-term memory is under investigation. Dr. W. Tatton's study of the mesencephalic reticular interaction with the lateral geniculate has been completed.

The main work of Professor J. Grayson's group, involving Mr. R. Coulson, Mr. B. Winchester, Mr. M. Robertson, and Miss C. Scott, has been directed to a study of blood flow in the myocardium of dogs, using heated thermocouples, and electromagnetic flowmeters done in conjunction with measurements of oxygen consumption and of local heat production. Pressure changes in small branches of the coronary anastomotic network have been followed also. The coronary vessels are seen to form a complex network of communicating vessels so that any particular area of heart has a complex alternative supply system. Changes following coronary occlusion have been followed with a view to elucidating the mechanism of myocardial infarction. A second major study by this group is that of heat production in the gastro-intestinal tract. Investigation of the sources of this heat production, which is large, suggests that much of it occurs in the mucosa and that glucose uptake and oxygen consumption account for a large part.

Professor P.E. Hallett joined the department in August 1969. With Mr. A.D. Lightstone and Miss J. Latremouille, he has been acquiring and constructing optical and electronic equipment for the study of a wide variety of problems relating to the function of the human eye and the visual system at night.

In Professor G.J. Hetenyi's section, work on the elucidation of mechanisms in glucose homeostasis has continued. In hypoglycaemic, conscious dogs, the increased rate of hepatic glucose production can be abolished by infusion of mannose, and to a lesser degree by betahydroxybutyric acid, but not by fructose. With Mr. D. Mak, it was found that removal of two-thirds of the liver did not affect the rate of glucose production in normal or diabetic rats and that the rate of glucose release by liver cells could be increased to more than ten times the basal rate. Dr. K. Norwich and Dr. Hetenyi continued their analysis of the glucoregulation, applying control system theory. Dr. Norwich's work has led to a new general theorem describing the disappearance of tracer from a system.

Professor J. Hunter, with Mr. O. Waler, Mr. E. Burke, and Mr. Z. Szaraz, has investigated the effect of free fatty acid on serum insulin levels elevated by glucose. The effect of octanoate on the improved glucose tolerance with successive doses of glucose (Staub-Traugott effect) is under study. In the cat, octanoate injection suppressed glucose utilization, but the average secretion of immunoreactive insulin was unchanged.

Professor F.C. Monkhouse, with Mrs. Susan Milojevic, has studied the purification and physiological importance of plasma antithrombin. Dr. Walter Seegers of Wayne State University has been carrying out studies on the biochemical reactions of the best of these purified antithrombin preparations with thrombin. Miss Anne Hedlin, with the assistance of Miss M.A. Rompila, has studied the effects of female sex hormones on the fibrinolytic system and has shown that certain birth control pills significantly increase the fibrinolytic activity of blood within 12 hours of ingestion. Miss Valerie McAlpine has tested the effects of exercise on the fibrinolytic system and has found that, if the exercise is sufficiently vigorous, there is a measurable increase in the blood fibrinolytic activity. Miss Adrienne Schmitt is studying inhibitors to the

fibrinolytic system and their relationship to antithrombin. In collaboration with Dr. R.L. MacMillan of the Department of Medicine, Mr. Campbell Cowan has continued studies on the factors influencing red cell and platelet clumping in patients with coronary thrombosis.

Professor L.W. Organ's section has begun studies on the relationship between slow wave activity and single cell spike activity in the cerebral cortex, and on neural coding of responses in the cat peripheral nerve and thalamus evoked by externally applied thermal stimuli.

The main project in Professor D. Osmond's laboratory concerns factors influencing the biological activity of renin in normotensive and hypertensive states. Studies on an inhibitor to the renal enzyme renin indicate that levels of an inactive phosphatide preinhibitor in blood do not fall in anephric dogs. Preparation of a radioactive preinhibitor is in progress with a view to measuring its rate of conversion to inhibitor in anephric rats and anephric patients. Bioassay of plasma renin activity has been used in studying the *in vitro* inhibition of angiotensin, in the determination of pressor responses to standard renins of various species and in the determination of *in vivo* inhibition of the pressor response to renin by prior infusion of preinhibitor, and the screening of anti-serum activity in rabbits immunized against angiotensin II amide. This group also is undertaking the preparation of renin and renin substrates from man and other species. Miss Patricia A. McFadzean has been developing a radioimmunoassay for angiotensin.

Professor J.W. Pearce and collaborators Professor H. Sonnenberg, Mr. A.T. Veress, Dr. E. Houttuin, Mr. U. Ackermann, and Dr. H. Bengel have continued a study of the regulation of body fluid volume by the kidneys. Recent experiments have demonstrated a blood-borne factor, released during sustained expansion of body fluid volume, capable of producing a modest increase in renal excretion by a second cross-circulated animal. Its action is on the renal tubule and its source does not appear to be the kidneys. Experiments using perfused dog kidney still fail to demonstrate an important role of renal nerves in the response of the organ to increased volume of body fluid. Alteration in renal blood pressure and alteration in blood viscosity are now being studied for their contribution to the response. The response is not entirely mediated by either hormones or nerves. By a combination of tracer techniques, the fate of infused fluids is being systematically explored to elucidate further the locations of sensors of fluid volume changes.

Professor Roy M. Preshaw has established a laboratory for gastrointestinal physiology and has begun studies on duodenal inhibitory mechanisms for gastric acid secretion in animals.

Professor A.M. Rappaport, with Dr. S. Ohira and Dr. J.S. Cowan, has continued research on the effects of hepatic arterial ischaemia as compared with portal venous ischaemia on survival and metabolism of partially and totally depancreatized dogs. Electronmicroscopic studies of the earliest damage of the liver parenchyma by Fulvine have been completed with Dr. E. Porta. *In vivo* studies of normal microcirculation showed evidence of intermittent arteriolar activity in mammalian liver. The effects on insulin output of hormones related to the regulation of carbohydrate metabolism have been studied in the isolated and exteriorized pancreatic remnant with Drs. R.E. Haist, S. Ohira, B.J. Lin, Mrs. J. Coddling, Mr. J.D. Henderson, and Professor N.F. Moody.

Professor Margaret Henderson Santalo has been studying the effect of continuous infusion of adrenaline, glucose, and adrenaline plus glucose on the insulin content, islet volume, and histology of the islets of Langerhans in the rat.

In Professor John Scott's section Mr. David Johnson has plotted the primary cortical receptor areas for the semicircular canals and Mr. P. Gibault has studied the interaction between the auditory cortex and the medial geniculate body.

In the section of Professors O.V. and A. Sirek, Dr. Nigishi Hotta found that the facilitatory effect of dihydroergotamine on lipolysis caused by growth hormone could be shown in isolated rat adipose tissue cells. Mrs. Margaret Brosnan continued her studies of the effect of growth hormone and placental lactogen on the composition

of the arterial wall in normal and endocrine-deficient dogs, and demonstrated that chronic administration of human placental lactogen causes a rise in the collagen content of the arch and thoracic segments of canine aorta. The effect of a new hypoglycaemic sulfonylurea preparation, glybenclamide (HB-419, Hoechst), on insulin secretion was studied in normal dogs and its effect was compared with that of tolbutamide. It was found that administration of beta-adrenergic blocking agents, such as propranolol or Kö592, abolished the stimulatory effect of both sulfonylurea preparations.

Professor H. Sonnenberg has carried out investigations of transferred natriuresis of blood volume expansion as a joint project with Dr. J. Pearce. He also has studied the effect of maintained vascular expansion on proximal tubular function of chronically salt-deprived and salt-loaded rats as well as mechanisms of proximal glomerulotubular balance during increased filtration. With Dr. H. MacKay, studies are being carried out on the effect of different levels of hydration on the renal response to blood volume expansion.

In Professor M. Vranic's section, the work on dogs with quantitatively matched insulin infusion continued. With Mr. A. Cherrington and Mr. P. Fono, it was shown that, in normal dogs, glucagon increases turnover of glucose up to twofold, but affects the plasma glucose concentrations only slightly. In collaboration with Professor G.A. Wrenshall and with the assistance of Mrs. N. Kovacevic, glucose homeostasis has been maintained during exercise in normal and partially depancreatized dogs. The results suggest the need of extra insulin supply during exercise under certain metabolic conditions. With the assistance of Mrs. N. Kovacevic, chemical methods to study the turnover of individual free fatty acids are being developed.

THESES COMPLETED

Ph.D. Thesis

Tung, Anthony K.-C. (1970), "Studies on the biosynthesis of proinsulin and insulin."

M.Sc. Theses

Barker, Doris Marilyn (1969), "A Study of experimental salt-induced hypertension in Dahl rats"; Bicknese, Marion Beatrix (1969), "Determinations of lipid and protein catabolic rates in the fasting dogs"; Bradley, Ian F. (1970), "The removal of chylomicron triglycerides"; Cherrington, Alan Douglas (1969), "Effects of glucagon in dogs maintained on matched insulin infusions and preliminary simulation studies involving these hormones"; Johnson, Walter David Fowler (1970), "The cortical evoked response from labyrinthine stimulation in the squirrel monkey"; Malik, Asrar B. (1969), "Hypoxic pulmonary vasoconstriction in anaesthetized dogs"; McIntosh, Mrs. Suzanne V. (1969), "Plasma glycoprotein synthesis in diabetic rats"; Waler, Oleh R. (1969), "The effect of free fatty acid on serum insulin levels elevated by glucose."

HONOURS

J.W. PEARCE, Chairman, Science Policy Committee of Can. Fed. Biol. Societies and Member of Council, SCITEC.

J.W. SCOTT, elected President of the Academy of Medicine, Toronto, for the year 1970-71.

SCHOLARLY ADDRESSES

R.L. COULSON and J. GRAYSON, "Relations of coronary pressure flow," Canadian Federation of Biological Societies, Montreal, June 1970.

R.L. COULSON, J. GRAYSON and M. IRVINE, "Reactivity of coronary anastomotic blood vessels," VI Conference of the European Society for Microcirculation, June 21, 1970.

A.O. DUROTOYE and J. GRAYSON, "Splanchnic heat production and ambient temperature," Canadian Federation of Biological Societies.

J. GRAYSON and R.L. COULSON, "Effect of coronary occlusion on coronary blood vessel responses to adrenaline," Canadian Physiological Society, Ste. Adele, January 23, 1970.

P.E. HALLETT, "Visual thresholds calculated for the Fuortes-Hodgkin automatic gain control filter," Physiological Society Meeting (Cambridge), June 1969; "The nature of the biological variations at the absolute threshold of vision," Ste. Adele meeting of the Canadian Physiological Society, January 1970; "The minimum energy requirements for human vision," Neurosciences Seminar, Department of Physiology, University of Toronto, February 1970.

G. HETENYI, "The regulation of blood glucose," MRC, Carshalton (Surrey, England), June 1969; "Glucose homeostasis," Department of Physiology, University of Ottawa, October 1969, and Department of Physiology, Dalhousie University, Halifax, N.S., November 1969; "Control mechanisms in glucose homeostasis," Biomed. Engineering, McGill Univ., Montreal, March 1970.

N. HOTTA, "Effect of dihydroergotamine on the isolated fat cell," Second Canadian Workshop on Diabetes, Mont Gabriel, Quebec, October 1969; "The effect of dihydroergotamine and growth hormone on lipolysis in the isolated rat adipose tissue cell," Federation Meetings, Atlantic City, April 1970.

F.C. MONKHOUSE, "The physiological importance of plasma antithrombin," presented at the Quebec Coagulation Conference, Sherbrooke, Quebec, April 28-30, 1970, in honour of the first graduating medical class from the University of Sherbrooke.

K. NORWICH, "Linearity of tracer systems," University of Ottawa, February 1970.

L.W. ORGAN, "Electrical impedance variation along a tract of brain tissue," International Conference on Bioelectrical Impedance, New York City, September 1969.

J.W. PEARCE, H. SONNENBERG, B. LICHARDUS and A.T. VERESS, "Interaction of extrarenal and intrarenal factors in 'volume natriuresis,'" Satellite Symp., IV Internat. Congress Nephrol., Bratislava, Czechoslovakia, 1969.

A.M. RAPPAPORT, "Hepatic microcirculatory changes leading to portal hypertension," paper illustrated by colour macrocinematography at the Symposium on the Hepatic Circulation and Portal Hypertension, N.Y. Academy of Sciences and the American Association for the Study of Liver Disease, N.Y., October 2, 3, 4, 1969; "Hepatic structure and microcirculation," Liver-Biopsy Rounds, Department of Pathology, University of Toronto, June 1970; "Normal microcirculation of the liver and its deterioration in the fatty liver," Liver Seminar, Toronto General Hospital, June 19, 1969; "The physiology of the intrahepatic circulation and microcirculation," Cardiovascular Graduate Study Group (Department of Physiology), November 20, 1969; "Structural, functional and microcirculatory aspects of the vertebrate liver," Staff and Students of Department of Parasitology, School of Hygiene, Catalog No. 1506, January 23, 1970.

A. SIREK, "The action of prolactin and placental lactogen in hypophysectomized dogs," Symposium on the Action of Hormones, Sinai Hospital, Detroit, July 1969.

O.V. SIREK, "Acute metabolic effects of growth hormone on plasma free amino acids and free fatty acids in dogs," Symposium on the Action of Hormones, Sinai Hospital, Detroit, July 1969; "The effect of dihydroergotamine on lipolysis caused by growth hormone, prolactin and placental lactogen in dogs," Second Canadian Workshop on Diabetes, Mont Gabriel, Quebec, October 1969; "The effect of dihydroergotamine on growth hormone-induced lipolysis in dogs," Second Winter Meeting of the Canadian Physiological Society, Ste. Adele, Quebec, January 1970, and the Clinical Research Society of Toronto, May 1970.

H. SONNENBERG, "Blood volume expansion and proximal sodium reabsorption in salt-loaded and salt-deprived rats," Amer. Physiol. Soc., 1969.

H. SONNENBERG, J.W. PEARCE and A.T. VERESS, "Evidence for a humoral effector of natriuresis," Fed. Amer. Soc. Exper. Biol., Atlantic City, N.J., 1970.

M. VRANIC, "Homeostatic mechanisms of glucose independent of insulin variation," Department of Physiology, University of Toronto, April 1, 1970; "Exercise, and glucose turnover in the normal, partially and totally depancreatized dogs on matched intraportal insulin infusion," 54th Annual Meeting of the Fed. Amer. Soc. Exper. Biol., Atlantic City, April 13, 1970; "Exercise, insulin and glucose turnover in dogs," Annual Meeting of the Clinical Research Society of Toronto, University of Toronto, May 9, 1970.

T.W. WILCZEWSKI, H. SONNENBERG and G. CARRASQUER, "Permeability of the proximal tubule and the loop of Henle to ^{14}C -urea and ^{22}Na ," Amer. Physiol. Soc., 1969.

PUBLICATIONS

- ASHFORD, W.R., CAMPBELL, J., DAVIDSON, J.K., FISHER, A.M., HAIST, R.E., LACEY, A.H., LIN, B., MARTIN, J.M., MORLEY, N.H., RASTOGI, K.S. and STORVICK, W.O. "A consideration of Methods of Insulin Assay" (*Diabetes*, vol. 18, 1969, pp. 828-33).
- BAUER, W.E., VIGAS, S.N.M., HAIST, R.E. and DRUCKER, W.R. "Insulin Response in Hypovolemic Shock" (*Surgery*, vol. 66, 1969, pp. 80-8).
- CAMPBELL, J. and RASTOGI, K.S. "Actions of Growth Hormone: Enhancement of Insulin Utilization with Inhibition of Insulin Effect on Blood Glucose in the Dog" (*Metabolism*, vol. 18, 1969, pp. 930-44).
- CAMPBELL, J., RASTOGI, K.S., GREEN, G.R. and LAZDINS, V. "Enhancement of the Utilization and Secretion of Insulin by Growth Hormone in the Dog" (*Canadian Federation of Biological Societies*, vol. 12, 1969, p. 64).
- COWELL, J.W.F. and HETENYI, G. JR. "The Effect of Phenoxybenzamine and Propranolol and their combination on the Restoration of Glucose Homeostasis after Insulin induced Hypoglycaemia" (*Archives of International Pharmacodynamics and Therapeutics*, vol. 178, 1969, pp. 412-22).
- FORBATH, N., HALL, J.D. and HETENYI, G. JR. "The Effect of Methylprednisolone on the Turnover of Lactate and the Conversion of Lactate to Glucose in Dogs" (*Hormone and Metabolic Research*, vol. 1, 1969, pp. 178-82).
- FORBATH, N. and HETENYI, G. JR. "Metabolic Interrelations of Glucose and Lactate in Unanaesthetized Normal and Diabetic Dogs" (*Canadian Journal of Physiology and Pharmacology*, vol. 48, 1970, pp. 115-22).
- GRAYSON, J., IRVINE, M. and PARRATT, J.R. "The Effects of Carbochromen on Myocardial Blood Flow and Metabolic Heat Production before and after Acute Coronary Ligation" (*British Journal of Pharmacology*, vol. 37, 1969, p. 523).
- HALLETT, P.E. "Rod Increment Threshold on Steady and Flashed Backgrounds" (*Journal of Physiology*, vol. 202, 1969, pp. 355-78).
- "Impulse Functions for Human Rod Vision" (*ibid.*, pp. 379-402).
- "The Variations in Visual Threshold Measurements" (*ibid.*, pp. 403-20).
- "Quantum Efficiency and False Positive Rate" (*ibid.*, pp. 421-36).
- "Visual Thresholds Calculated for the Fuortes-Hodgkins Automatic Gain Control Filter" (*ibid.*, vol. 204, 1969, p. 7, T).
- HEDLIN, A.M. and MONKHOUSE, F.C. "Fibrinolytic Activities of Euoglobulins Precipitated at pH 6.4, 6.0 and 5.3" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, 1969, pp. 935-40).
- ISHIWATA, K., HETENYI, G. JR. and VRANIC, M. "Effect of D-glucose and D-ribose on the Turnover of Glucose in Pancreatectomized Dogs maintained on a Matched Intraportal Infusion of Insulin" (*Diabetes*, vol. 18, 1969, pp. 820-7).
- KERR, F.W.L. and PRESHAW, R.M. "Secretomotor Function of the Dorsal Motor Nucleus of the Vagus" (*Journal of Physiology*, vol. 205, 1969, pp. 405-15).
- LIN, B.J. and HAIST, R.E. "Insulin Biosynthesis: Effects of Carbohydrates and Related Compounds" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, 1969, pp. 791-801).
- LOVE, J.A. and SCOTT, J.W. "Some Response Characteristics of Cells of the Magnocellular Division of the Medial Geniculate Body of the Cat" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, 1969, pp. 881-8).
- MACKAY, H.F. and SIREK, O.V. "Dermal Hyaluronate and Diabetes in Experimental Animals" (*Canadian Physiological Society*, 2nd Winter Meeting, 1970, p. 51) (abstract).
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PREVENTIVE MEDICINE

Under the direction of Professor H.S. Gear

INTRODUCTION

The Faculty of Medicine and the School of Hygiene secured the approval of the Senate and the Board of Governors in May 1969 for the establishment of a joint department of Preventive Medicine. This provided for a component in the Faculty of Medicine to undertake immediately the planning of the subject in the new curriculum for undergraduate medical students, and a component to be developed in the School of Hygiene for graduate programmes.

The philosophy to guide the component in the Faculty of Medicine in introducing Preventive Medicine into the new curriculum had been established by an Interdivisional Committee under Vice President John D. Hamilton, with representatives from the Faculty of Medicine and the School of Hygiene. This required the subject to be given a clinical and epidemiological orientation and to be taught throughout the four years of the undergraduate medical course. Teaching, it stated, should be generally included as a normal feature of each "System" and each "Topic" in each of the three Periods, and consequently be the responsibility of the teams organized by the respective "Systems" and "Topics" Committees.

The Interdivisional Committee then decided that this policy of developing the curriculum through the "Systems" and "Topics" committees in each Period of the

undergraduate curriculum could be undertaken with only a nucleus of staff in the component in the Faculty of Medicine. It, therefore, recommended the appointment of three to four regular staff members in the Faculty of Medicine and cross-appointments for teaching be made with the School of Hygiene and other departments in the Faculty of Medicine.

This joint department of Preventive Medicine became operative in July 1969 when Dr. H.S. Gear as Chairman and Professor and Dr. D.R. Warren as Associate Professor were jointly appointed. The Faculty of Medicine and the School of Hygiene were unable to appoint the further two officers originally proposed because of the restrictions placed on the budget for the forthcoming two years.

A further disadvantage of the budget restriction has been the failure to obtain suitable space for the new department. Through the goodwill and the contribution of the School of Hygiene, both Dr. Gear and Dr. Warren and their secretaries have been accommodated temporarily in that building. The original plan to put the officers of each clinical department, including Preventive Medicine, in the old Anatomy Building had to be shelved. However, this grouping of these departments in one building has obvious advantages and is still intended.

THE INTRODUCTION OF PREVENTIVE MEDICINE INTO THE NEW CURRICULUM IN 1969-70

The following developments have taken place:

Period I: a representative has been appointed to each of the committees responsible for the Topics of Cell Biology and Behavioural Sciences.

Periods II and III: a representative has been appointed to, or is being sought for, each of the Systems and Topics committees.

Central Time - Period III: A number of subjects of importance to Preventive Medicine but outside "Systems" and "Topics" have been introduced through the use of "Central Time," e.g. control of communicable disease, environmental health, industrial medicine, organization of medical services, voluntary health service.

Epidemiology: some special time has been found at the end of Period I for an introductory course in this subject. Negotiations are taking place for further time at the beginning of Period II. Specific examples, in addition, will be described in certain selected subjects in a number of the "Systems" and "Topics," especially in Period II.

Medical Statistics: The Department of Preventive Medicine has secured 16 hours in Period I for a course in statistics for those who have not previously had any training in the subject.

Community Health and Family Practice: following the representations in the responsible Faculty Committee, a partnership has been accepted between the two departments, i.e. first Family and Community Medicine, and secondly Preventive Medicine to include preventive medicine in the 15 half days allocated to Family Practice in Period III. This will enable suitable examples of the subject to be taught in out-patient departments, in doctors' offices, in homes, and in the community. This will include consideration of the use of official and voluntary health agencies.

NEGOTIATIONS FOR CROSS-APPOINTMENTS

During the year negotiations were also initiated to secure representatives of Preventive Medicine in (i) each Committee of each Period of the New Curriculum, (ii) each clinical department, and (iii) each teaching hospital.

This fuller and more direct representation than that previously operating for selected Systems and Topics committees is required to meet the introduction of the complete new curriculum by the academic year 1970-71.

Wherever possible, a representative is being sought in the committee, clinical department, or teaching hospital itself in preference to naming a preventive medical or public health expert from "outside." A keenly interested person will likely be a more

successful ambassador of preventive medicine in his own subject or unit than someone added to it. These individuals will be given status by cross-appointments.

As indicated above, there will be a need for teaching in special subjects or for "Systems" and "Topics" committees unable to obtain sufficient or suitable teachers directly themselves. In such instances the Department of Preventive Medicine is proceeding to find teachers from the School of Hygiene, the Faculty of Medicine, or from outside services and institutions, including industrial and voluntary organizations. Direct appointments to the Department will be made.

ELECTIVES

The Department of Preventive Medicine is finding the arrangement for "Electives" valuable in introducing interested students to a variety of subjects. Of special note is the agreement reached with the Department of Social and Preventive Medicine of the University of the West Indies to accept up to four students for each Period III elective period in an academic year.

GENERAL

Because the department has just been launched and staff and funds are not immediately available, no research or graduate programmes have yet been started. However, these must follow, including conjoint programmes with the component of the joint Department in the School of Hygiene.

PSYCHIATRY

Under the direction of Professor R.C.A. Hunter

EDUCATION

Undergraduate Medical

The department's teachers participated fully in the teaching of the new curriculum. The five-week Psychic System teaching in Period II was a particular challenge, and was carried out ably in the teaching general hospitals. Dr. A.J. Preston, in charge of undergraduate education, was responsible for the arrangements, and this new venture was well received by both students and members of Faculty.

Postgraduate

Postgraduate students and fellows registered with the department numbered 106. Under Dr. V.M. Rakoff, the postgraduate curriculum continues to evolve in both process and content. The elected president and vice-president of the residents were made members of the Departmental Planning Committee, thus continuing and strengthening student participation in departmental planning and policy-making. Certification or Fellowship in the Royal College of Physicians and Surgeons of Canada was obtained by 23 of our students, and 20 students were awarded the Diploma in Psychiatry of the University of Toronto. In these latter examinations, Professor J.S. Tyhurst of the University of British Columbia was the external examiner.

Non-Medical

Members of the department substantially increased their contribution to the education of all varieties of mental health workers, including students in the areas of rehabilitation and corrections. The Ph.D. minor course for the Faculty of Arts and Science continued under Professor A.B. Stokes.

CLARKE INSTITUTE OF PSYCHIATRY

The organizational and administrative changes mentioned in the *Report* for 1968-69 were completed. In addition, the consultants in Psychology and Social Work, the Director of Nursing, and the Chief Resident were added to the Medical Advisory Committee. A professional advisory committee was formed in order to facilitate interdisciplinary co-operation and the evolution of new patterns of care. The Institute is now functioning at full capacity and is providing about 4,000 ambulant patient visits per month, and an average of 5,339 patient days-of-care per month. The Research Advisory Committee has filled a valuable function under its elected chairman, Dr. G.M. Brown, and, as well as assisting in the administration of the research sections, compiled a catalogue of current research projects. Dr. D.B. Coates resigned as chief, Section on Community Studies.

GENERAL HOSPITALS

At Toronto General Hospital the clinical facilities moved into the Burnside Building and the Annex, thus providing space for both in- and out-patient services. A hospital division of Clinical Psychology which is administratively connected with the hospital Department of Psychiatry, was formed. Dr. E.J. Rzaeki was appointed Clinical Director, and the consultation services re-organized under Dr. A.L. Jones, the better to discharge the academic and service functions. Various liaisons with community agencies were established or strengthened, and the research facilities were improved.

The Toronto Western Hospital Department of Psychiatry inaugurated its new day hospital and ambulant patient clinic at 452 College Street. The Department of Psychiatry at St. Michael's Hospital considerably increased its teaching and service scope, as did the departments at New Mount Sinai Hospital, the Wellesley Hospital, and Sunnybrook Hospital. At the Wellesley Hospital a new Day Care Centre was established at Wilhelmson House.

CHILDREN'S FACILITIES

At the Hospital for Sick Children, several new research projects were launched and consultative and ambulant patient services were improved.

MENTAL HOSPITALS

At the Queen Street Mental Health Centre (for adults) and at Thistletown Hospital (for children) moves have been initiated to integrate the function of these two facilities more closely with their other University affiliated sister hospitals.

The department wishes to record its deep regret and sense of loss on the death of Professor Emeritus C.B. Farrar on June 3, 1970. Professor Farrar was 95 when he died. Many of the more admirable qualities of the present-day department rest on his pioneering work.

RESEARCH

This is the first report to be written by the newly formed subcommittee on research which is just completing its first full year of operation. Until now this task has been performed by Professor J.W. Lovett Doust whose contributions to the field of psychiatric research are known to everyone within the department.

Biochemistry, Endocrinology and Metabolism

At the Clarke Institute section of neuroendocrinology, Dr. G.M. Brown and his group have been active in several areas. They are investigating hypothalamic pathways mediating growth hormone and adrenal stress responses in the squirrel monkey. They have found that the triggering stimuli are different and there appear to be two separable systems functioning. They are also studying neural and psychic factors producing

uniquely high cortisol levels in the same animal. Other projects include fractionation of monkey pituitaries, studies of adrenal and gonadal regulation in rats with the "septal syndrome," the role of catecholamines in regulation of the oestrus cycle in the rat, and the effect of testosterone on libido. Also at the Clarke Institute, Dr. H.C. Stancer and his associates extended their work on the clinical investigation unit and in the metabolic and neurochemical laboratories. On the clinical investigation unit, in collaboration with Dr. S. Murray of the Toronto General Hospital, Drs. Kivi and Godse studied the relationship of thyroid hormone, biogenic amines, and amino acids in periodic affective disorders. The efficacy of L-Dopa in the treatment of the latter was also pursued. In the metabolic laboratories Dr. Godse and Mrs. V. Grant developed a continuous method for the analysis of blood free fatty acids which will next be tested in dogs *in vivo*. Several projects were completed in the neurochemical laboratory. Dr. Bazan completed his studies on the role of asphyxia and electro convulsive shock on brain membranes by measuring the release of free fatty acids from synaptosomes. Work on the P-32 uptake into the phospholipids of beef pineal compared with other endocrine glands was extended by studying the effects of additives on the initial lag of uptake. Dr. Peachey completed the experimental part of the relationship of biogenic amines and behaviour in squirrel monkeys and began the evaluation of his results. Studies were commenced on ways of evaluating peripheral central relationships of norepinephrine and serotonin, respectively.

Childhood and Adolescence

At Thistletown Regional Centre, Dr. H. Alderton is investigating the response to residential treatment in disturbed boys, using the children's pathology index which he developed. He is also attempting to assess the relationship between treatment response and variables such as intelligence and parental visiting. An additional investigation examines the relationship between treatment response and the changes in school adjustment and family functioning of a group of children receiving residential treatment. Dr. C. Chamberlain of the C.M. Hincks Treatment Centre is involved in the establishment there of a residential and day treatment programme for adolescents and a programme of evaluation and follow-up is being developed. Dr. M. Havelkova of the Hospital for Sick Children continues to pursue her interest in studying brain dysfunction in pre-school children. She is also developing and evaluating group treatment techniques for both pre-school children and borderline adolescents. Doctors Levine and Steinhauer carried out a survey of psychiatric emergencies involving children and adolescents in Metro Toronto. Dr. Levine is also investigating cultural determination of psychiatric symptoms in children and the effects of hospitalization on children's behaviour. He has recently begun a study on the adolescent amphetamine user. Dr. J. Van Leeuwen at the Hospital for Sick Children is appraising the psychiatric aspects of renal failure, haemodialysis, and kidney transplantation in a pediatric setting.

Clinical Studies

Dr. E.F.W. Baker continues his study on bimedial frontal leukotomy and LSD psychotherapy at the Toronto Western Hospital. He is also investigating Na-22 transfer between serum and cerebral spinal fluid. At the Mental Retardation Centre Dr. A. Bonkalo is evaluating the environmental effects of various behaviour patterns on a rating scale. Dr. G. Boujoff at the New Mount Sinai Hospital continues his interest in determining personality characteristics of unwed mothers. Dr. J.M. Jameson has been conducting a research programme in Wolpean systematic desensitization. In this context he has been trying recently to determine the most effective physiological parameter for the measurement of anxiety. At the Clarke Institute Dr. J.W. Lovett Doust's current activities include the phenomenology of atypical organic psychoses and the facilitation of communication processes in group settings. At the Queen Street Mental Health Centre he is involved in a study on the electrolyte balance in affective disorders. Dr. J. MacDonald at the Toronto Western Hospital is studying the psychiatric aspects of organ transplant. Dr. C.V. Murray at St. Michael's Hospital is col-

laborating with members of the Department of Obstetrics and Gynaecology in a study of psychophysiological correlates of pre-menstrual affective disorders. At the Toronto General Hospital Dr. R. Pos is evaluating electric sleep therapy and is involved in studies on desensitization in phobic states. Dr. L.B. Raschka at the Clarke Institute is investigating the effect of vasodilator agents in schizophrenia and has undertaken a study of rheoencephalography in dementia. At the Toronto Western Hospital Dr. M. Seeman continues to pursue her interest in the linguistic aspects of psychotic speech. Also at the Toronto Western Dr. R. Shoichet is evaluating hypnotherapy in obesity and group therapy with arthritic patients. Dr. L. Solursh at the same hospital continues his studies on LSD psychotherapy. At St. Michael's Hospital Dr. W.J. Stauble has initiated a project involving hospital treatment of postpartum mothers accompanied by their infants. Dr. E. Rzadki, in collaboration with Dr. L. Goldsmith and Dr. Evans at the Toronto General Hospital, is conducting research into the psychological and physiological correlates of psychogenic pain. At Sunnybrook Hospital Doctors C.M. Mickelson and J. Holmes have collaborated with Dr. D.Z. Borensztajn in a biochemical investigation of patients suffering from the manic depressive syndrome.

Forensic Psychiatry

At the Clarke Institute Dr. K. Freund continues with his analysis of the erotic preference orders in different groups of sexually deviant males. Also at the Clarke Institute Doctors B. Steiner and A. Zajac, as well as others, have developed the Gender Identity Project which is a multi-disciplinary study of trans-sexuals. At the Toronto General Hospital Dr. J. Cooper has completed his three-year pilot project on counselling of inmates at Mimico Reformatory by correctional officers.

Genetics

At the Toronto Western Hospital Dr. L. Solursh is assessing chromosomal abnormalities found in LSD users. Dr. D.N. Luciani is screening autistic children for chromosomal abnormality at the Mental Retardation Centre.

Mental Retardation

Dr. J.B. Fotheringham continues his investigations of the relationship between parental attitudes and marital integration to school achievement and behaviour disorders in trainable mentally retarded children.

Psychology

Dr. K.G. Ferguson is developing and evaluating an automated psychological test programme at the Clarke Institute. In this he is assisted by Dr. D. Paitich, who is also working on validity and standards for the Clarke WAIS group vocabulary test.

Psychopharmacology

At the New Mount Sinai Hospital Dr. G. Baker continues his research into the electron transfer function of phenothiazines. At the Clarke Institute Dr. O. Hornykiewicz has been interested for some time in the action of L-Dopa on locomotor activity in relation to the regional distribution of this substance and its metabolites. He is also studying the action of neuroleptic drugs on dopamine metabolism in the caudate nucleus and relating this to the extrapyramidal potency of these compounds. Dr. J.W. Lovett Doust has been investigating the influence of psychotropic drugs on the rheoencephalograph and the use of lithium carbonate in manic depressive disease. These studies have been carried out at the Queen Street Mental Health Centre. Dr. W. Otto and Dr. S. Greben are collaborating on a study of the effects of L-Dopa on patients with Parkinsonism at the New Mount Sinai Hospital. At the Toronto Western Hospital, Dr. M. Seeman is comparing the action of protriptyline and imipramine.

Psychophysiology and Neurophysiology

Dr. J.W. Lovett Doust continues his many studies, both at the Clarke Institute and the Queen Street Mental Health Centre. These include factors affecting rheoencephalography, telemetered emotional responses in therapeutic procedures and studies of the neurophysiology of sleep. Dr. R. Pos of the Toronto General Hospital pursues

his long-term interest in informational underload and its possible relationship to psychosis. In addition, he is involved currently in studies in electric sleep therapy and the neurophysiology of primary process states. At the same hospital Dr. R.V. Worling is studying normal and restricted sensory input in split brain cats and Dr. P. Brawley has recently begun a comparative study of alpha blocking in schizophrenia, acute anxiety states, and normal subjects. At the Toronto Western Hospital Dr. L. Solursh is investigating the EEG correlates of LSD flashbacks.

Psychosomatic Medicine

At the New Mount Sinai Hospital Dr. R. Freebury is studying the psychological components of the function of the coronary care unit. Dr. H. Moldofsky continues his studies of rheumatoid arthritis at the Wellesley Hospital. At the Clarke Institute he is involved in a psychophysiological investigation of multiple tics and the Gilles de la Tourette Syndrome and has recently begun a study of hunger and obesity.

Sociology and Epidemiology

At the Clarke Institute Professor N.W. Bell and his group continue their detailed enquiry into the dynamic properties of family life. Dr. D.B. Coates, also of the Clarke Institute, has been analysing the results of the Yorklea Household Environment Survey done in 1968 and also the Metro hospitalization study of the same year. He has been flying to northeastern Ontario on a regular basis to study service utilization in a northern rural community, and, in addition, is completing a one-year follow-up as part of his study on symptoms, life events, and personal problems. Mr. C. Greenland of the Clarke Institute is carrying out a study on violence and dangerous behaviour and its relationship to mental disorder. He is also doing a psychobiographical study of a child prodigy from Belleville, Ontario, and continues to pursue his researches in the history of psychiatry. At the University of Toronto Health Service Dr. J.E. Rogers has been investigating the prevalence of psychiatric symptoms and drug abuse in samples, of both a clinical population and of randomly chosen University students. Dr. L.W. Woods at St. Michael's Hospital has made a study of that group of patients who have been characterized by "downward drift" in a social sense. He is also taking a multi-dimensional look at a general hospital out-patient department.

Transcultural Studies

Dr. P.M. Yap at the Clarke Institute is conducting a research programme into the nosology of the culture-bound reactive syndromes and ethnic variations in guilt among patients with affective disorders.

HONOURS

DR. P.A. CHRISTIE, Acting Editor, Canadian Psychiatric Association Journal.

DR. C.B. FARRAR (Professor Emeritus), 1969 Distinguished Service Award of the Thomas W. Salmon Committee on Psychiatry and Mental Hygiene, New York Academy of Medicine (*in absentia*).

DR. K.G. GRAY, Chairman, Committee on Definition of Death, Canadian Medical Association.

DR. O. HORNYKIEWICZ, Research Medal ("Meritorious Award") for 1969 of the American Association for Research in Nervous and Mental Disease, "in recognition of his pioneering biochemical investigations of the basal ganglia and of the chemical pathology of Parkinsonism"; First Gold Medal for research in Parkinsonism, by the Canadian Parkinson's Disease Association.

PROF. R.C.A. HUNTER, chairman, Committee on Psychiatry, Royal College of Physicians and Surgeons of Canada, March 1970; member, Council, Royal College of Physicians and Surgeons of Canada, March 1970; member, Psychiatry Test Committee, National Board of Medical Examiners, U.S.A. 1970.

DR. H. MOLDOFSKY, McLaughlin Travelling Fellowship 1970-71.

DR. R. POS, chairman, Canadian Chapter, American Society for Cybernetics; director, American Society for Cybernetics.

DR. H.A. STANCER and his associates received the 1970 Clarke Institute of Psychiatry Research Award for the publication "Longitudinal Drug Study and Central Amines," which appeared in the *Archives of General Psychiatry*, 1969, 20, 290.

DR. W.J. STAUBLE, vice-president, Canadian Psychoanalytic Society; president, Canadian Psychoanalytic Society (Ontario).

PROF. A.B. STOKES, president-elect, Canadian Psychiatric Association; chairman, Committee on Drug Misuse, Canadian Psychiatric Association.

DR. L.P. SOLURSH, chairman, Special Committee on the Non-Medical Use of Drugs, Canadian Medical Association.

SCHOLARLY ADDRESSES

DR. H.R. ALDERTON, "Symptom Evaluation and Treatment Selection in the Latency Aged Child," Seminar in Child and Adolescent Psychiatry, Department of Psychiatry, April 1970.

DR. E. BRODER, "Treatment of Adolescents," Conference on Professional Practices, Toronto, November 1969.

DR. G.M. BROWN, "Growth Hormone and Psychiatry," Ontario Psychiatric Association Annual Meeting, January 1970.

MRS. D. BURWELL, "Nurse's Reactions and Patient Care," Registered Nurses Association of Ontario Conference, Geneva Park.

DR. D.B. COATES, "Hospital's Role in the Prevention and Treatment of Psychiatric Disorders," Ontario Hospital Association Annual Meeting, Toronto, October 1969; "Psychiatric Patient: Who Is and Who Should Be?" Guest lecture, Department of Psychiatry, University of British Columbia, January 1970; "Mood and Energy Covariation in Married Couples," Clinical Research Society of Toronto, May 1970.

DR. J.J.I. COOPER, "Confidentiality and Privileged Communication - The Psychiatrist's Dilemma," Ontario Psychiatric Association Meeting, Toronto, January 1970.

DR. M.A. FISCHER, "Therapeutic Parenting in a Residential Treatment Center: theoretical and practical considerations," Department of Psychiatry, University of Cape Town.

DR. D.R. FREEBURY, "Intensive Caring. Appraisal of some of the Psychological Issues," Annual Meeting, Ontario Medical Association, Section on Psychiatry, Ottawa, May 1970.

DR. S.J.J. FREEMAN, "Real Look at Community Psychiatry," McMaster University, Department of Psychiatry, February 1970; "Case Study of a Multi-Agency Service Delivery Programme," School of Hygiene, University of Toronto; "Concepts of Positive Mental Health," Canadian Mental Health Association, Annual Conference, London, Ontario.

DR. H. GOLOMBEK, "Contemporary Adolescence," Seminar in Child and Adolescent Psychiatry, Department of Psychiatry, University of Toronto, April 1970.

DR. K.G. GRAY, "Psychiatric Problems under the New Divorce Act," Department of Psychiatry, University of Ottawa, November 1969; "Facilities of the Clarke Institute," Canadian Bar Association, Criminal Justice Subsection, January 1970; "Forensic Psychiatry," Osgoode Hall Law School, York University, March 1970.

MR. C. GREENLAND, "Violence and Dangerous Behaviour Associated with Mental Disorder: Prospects for Prevention," John Howard Society Annual Meeting, Saskatoon.

DR. O. HORNYKIEWICZ, "Pharmacology and Pathophysiology of Dopamine Neurons," First International Symposium on Cell Biology and Cytopharmacology, Venice, July 1969; "Metabolism of Brain Dopamine in Human Parkinsonism," Second International Meeting, International Society for Neurochemistry, Milan, September 1969; "Monoamines and Parkinsonism." Symposium on Parkinsonism and L-Dopa, 9th International Congress of Neurology, New York, September 1969; "How does L-Dopa Work in Parkinsonism," Laurentian Research Conference on L-Dopa, November 1969;

"Control by Substantia Nigra of Biogenic Amine Metabolism in the Striatum," Symposium on Substantia Nigra and Sensorimotor Activities, Newark, N.J., December 1969; "Unique Actions of Dopamine in the Central Nervous System," Symposium: Circulatory and Central Nervous System Actions of Dopamine: Evidence for a Specific Dopamine Receptor, 54th Annual Meeting, FASEB, Atlantic City, April 1970.

PROF. R.C.A. HUNTER, "Forgiveness, Retaliation and Paranoid Reactions," Canadian Psychoanalytic Society (Ontario), November 1969.

DR. S.V. LEVINE, "The Inner City: Setting, Subgroups, Psychopathology and Service," 47th Annual Meeting, American Orthopsychiatric Association, March 1970, San Francisco; and at the Annual Meeting of the Ontario Medical Association, Psychiatric Section, May 1970, Ottawa.

DR. R. LINDENFIELD, "Social Work: One Dimension in Health Care," "The Knowledge Base in Social Work," "The Application of Theory to Practice in Social Work," University of Alberta, Edmonton, September 25, 1969.

DR. P.H. MELVILLE, "The Raven's Eye," community psychiatry programme at Northeastern Psychiatric Hospital, delivered at Ontario Psychiatric Association's Annual Meeting, Toronto, January 1970.

DR. A. MILLER, "Psychiatry over the Last Decades," International Symposium on Psychiatry, Montebello, Quebec, November 1969 (title of paper "Role of the Mental Hospital in Modern Psychiatric Treatment").

DR. H. MOLDOFSKY, "Emotions in Rheumatoid Arthritis," Annual Fall Meeting, Ontario Psychiatric Association, October 1969; "Personality, Disease Parameters and Medication in Rheumatoid Arthritis," Annual Meeting, Arthritis Foundation, Detroit, June 1970.

DR. D.J. McCULLOCH, "Maths of the System," Conference sponsored by Ontario Institute for Studies in Education, "The Student and the System."

DR. E.H. PAKES, "Psychological Impact of Leukemia" presented at the Clinical Research Society of Toronto, May 1970.

DR. R. POS, "Neurophysiological Research into the Informational Underload Theory of Freudian Primary Process States," NASA Arousal Symposium, University of Vermont, September 1969.

DR. Q. RAE-GRANT, "Patterns of Service in the Treatment of Children," Conference on Professional Practice, November 1969; "Problems of Hospitalization in the Chronically Ill Child," with Dr. J.J. Van Leeuwen in collaboration with Albany Medical College, Radio Conference for Physicians, November 1969; "Art of Being a Failure as a Consultant," Mental Health Consultation Conference, State University of New York, Buffalo, January 1970; "Adult and Child Psychiatry - One or Two Nations?" Annual Meeting, Ontario Psychiatric Association, January 1970; "Community's Responsibility for its Mental Health," 12th Annual Meeting, Canadian Mental Health Association, York County Branch, March 1970; "Communication with Youth," Ontario Medical Association Annual Meeting, Ottawa, May 1970.

DR. V.M. RAKOFF, "Conceptions of Personality and Political Structures," and "Language of the Aesthetic Experience," University of Guelph, 1970; "Strategies in Family Research: Towards Small Studies," Harvard University, Boston, Community Research Laboratory, March 1970; "Psychiatric Education," McGill University, March 1970; "Aesthetic Experience as Analogue State," Canadian Chapter of American Society for Cybernetics, May 1970.

DR. M.D. REJSKIND, "Crisis Intervention," University of Buenos Aires, March 1970.

DR. P.D. STEINHAUER, "Psychiatrist's Impressions of Guidance Counselling in the Toronto Schools," 8th Annual Liaison Conference sponsored by Metropolitan Toronto Guidance Council.

DR. L.P. SOLURSH, "Drugs, Use and Abuse," at Department of Psychiatry, University of Washington; North Peel Medical Society; Toronto Medico-Legal Society; University of Saskatchewan, Department of Psychiatry; Ontario Medical Association, Annual Meeting, Ottawa; and Canadian Hospital Association, Edmonton.

DR. R.E. STOKES, "Aircraft Hijacking" and "Psychiatric Problems in Air Crew," Human Factors Symposium, Canadian Armed Forces Institute, April 1970; "Community Psychiatry - As it Applies to Industrial Problems," Psychology Division, Urwick Currie & Partners Ltd., Management Consultants.

DR. P.M. YAP, "Nosology and the Comparative Psychiatry," Allan Memorial Institute, Montreal, January 1970; "Some Clinical Issues in Transcultural Psychiatry," Department of Psychiatry, Montreal General Hospital, January 1970; "Clinical Research in Transcultural Psychiatry," Rockland State Hospital, Orangeburg, New York; "Cultural Patterning of the Psychogenic Syndromes," Hoffmann La Roche Lecture, Department of Psychiatry, Queen's University, Kingston, May 1970; "Contributions of Comparative Psychiatry to the Structural Analysis of Mental Disorder," Herman Goldman Lecture, New York Medical College, Metropolitan Hospital Center, New York.

PUBLICATIONS

- ALDERTON, H.R. "Caring and Counting" (*Canadian Psychiatric Association Journal*, vol. 15, 1970, pp. 289-94).
- "Comparison of the Follow-up Status of Children's Aid Society Wards and Non-wards Treated in a Children's Psychiatric Hospital" (*Canadian Medical Association Journal*, vol. 101, 1969, pp. 1035-42).
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RADIOLOGY

Under the direction of Professor R. Brian Holmes

During the past year the major event has been the creation of the Radiology Research Laboratory located in the Medical Sciences Building and functioning under

the direction of Professor E.N.C. Milne. In this regard we are most grateful for the help and co-operation of Dean A.L. Chute and Professor J.C. Laidlaw, Director of the Institute of Medical Science. Its creation has necessitated considerable structural alteration to the assigned space but this is currently being carried out. Equipment has been ordered, research projects have been decided upon, and commencement of them awaits only the completion of the facilities.

Dr. M.E. Forbes, Radiologist-in-Chief at the Women's College Hospital, was appointed to the Faculty. Thus this department becomes a division within the University Department of Radiology, where its main contribution initially will be to the undergraduate curriculum.

The advent of the new curriculum and the assignment of a rotation during the clinical clerkship into Diagnostic Radiology represents a major change in the department's role in undergraduate medical education. The commencement of the Period II portion of the curriculum is also having an impact on the department which is now obligated to provide teaching services of a nature and extent not previously asked of it.

The postgraduate programme leading to the Diploma in Medical Radiology continues to be active and to come under review.

During the year 1969/70 the Diploma Course DMR(T) was reorganized. A three-month introductory period consisting of an integrated course of physics, radiobiology, and radiotherapy was established. In addition, seminars in radiotherapy and physics have been held and have proved worthwhile. Of the eleven residents in radiotherapy at the Princess Margaret Hospital, six were registered in the DMR(T) course, four in the first year, and two in the second.

The increasing requirements of faculty members in this department, in the absence of corresponding financial support from the University, is placing a serious strain on the department's manpower situation.

VISITORS

During the year the Department of Diagnostic Radiology was honoured by visits from the following distinguished radiologists: Dr. F. Garrett Anderson, Cheshire, England; Dr. K. Thummoon, Pzasat Neurological Hospital and Institute, Bangkok, Thailand; Dr. M. Viamonte, Jr., University of Miami; Dr. B. Kaufman, Case-Western Reserve University, Cleveland; Dr. John Hodson, Memorial University, Newfoundland; Dr. Arthur Clemmett, St. Vincent's Hospital, New York; Dr. John Campbell, Indiana University; Dr. John Kirkpatrick, Children's Hospital, Philadelphia; Dr. K. Sakurai, Department of Radiology, School of Medicine, Yamaguchi University, Ube, Japan.

The Department of Radiotherapy was honoured by the following distinguished visitors: Dr. Joseph W. Leverenz, American Cancer Society, Washington, D.C.; Dr. W.B. Dawson, Clatterbridge Hospital, Liverpool, England; Mr. W.I. Campion, A.E. Lunt, Limited, Liverpool, England; Miss Mary Holthouse, Matron, Royal Marsden Hospital, Sutton, England; Patricia M. Turnbull, Charing Cross Hospital, London, England; Dr. Antonio de Padua Bertelli, São Paulo, Brazil; Dr. Jefferson J. Vorzimer, Beth Israel Hospital, New York City; Dr. David S. Scotch, New York University School of Medicine, New York City; Dr. Bruce Kynaston, Queensland Radium Institute, Brisbane, Australia; Dr. Gunther Ehlers, Roswell Park Memorial Institute, Buffalo, New York; Dr. Archie Fine, Professor, University of Cincinnati and Jewish Hospital, Cincinnati, Ohio; Dr. Brusori, Cuneo Hospital, Cuneo, Italy; Dr. Roberto Algranati, Roswell Park Memorial Institute, Buffalo, New York; Dr. Zarabini, Iurea, Italy; Dr. W.J. Moon, Peter MacCallum Clinic, Royal Melbourne Hospital, Melbourne, Australia; Dr. Lois Bingham Butler, Arlington, Virginia; Dr. Antony M. Goldstein, Christchurch Hospital, Christchurch, New Zealand; Dr. V. Moser, Linz, Germany; Dr. M. Lederman, Royal Marsden Hospital, London, England; Dr. Robert G. Whiston, Saint John, New Brunswick; Dr. W.B. Fleming, Peter MacCallum Clinic, Royal Melbourne Hospital, Melbourne, Australia; Dr. Torsten Landberg, Radiotherapy Department, University Hospital, Lund, Sweden; Dr. J.D. Abbott,

Radiation Protection Division, Department of National Health and Welfare, Ottawa; Dr. Rossall Sealy, Radiotherapy Department, Groote Schuur Hospital, Capetown, South Africa; Dr. W. Evers, Radiotherapy Department, University Hospital of Nymegen, Holland; Dr. M.R.M.J. van de Voort, The Netherlands; Dr. Jorgan Rygård, Copenhagen, Denmark; Dr. Victor Levison, Radiotherapy Department, North Middlesex Hospital, London, England; Dr. D.A. Lundberg, Neutron Division, Elliott Automation, London, England; Dr. E. Scherer, Professor, Clinic for Radiotherapy der Ruhr-Universität, Essen, Germany; Dr. C.A. Joslin, Velindre Hospital, Whitchurch, Cardiff, Wales; Dr. R. Nissen-Meyer, Aker Hospital, Oslo, Norway; Dr. T.B. Brewin, Western Infirmary, Glasgow, Scotland; Dr. R. Vera, Caracas, Venezuela; Dr. Klaus Mayer, Memorial Hospital for Cancer and Allied Diseases, New York City; Dr. F.T. Brayer, Georgetown University Medical Center, Washington, D.C.; Dr. Sydney Curwen, Radiotherapy Centre, Bristol, England; Professor Yukio Ishibashi, Tokyo, Japan; Dr. Kazataka Ashikawa, Tokyo, Japan; Dr. Kiichi Inoue, Tokyo, Japan; Dr. H. Brenner, England; Mr. J.L. Hayward, Guy's Hospital, London, England; Professor Ko Sakurai, Yamaguchi University School of Medicine, Ube, Japan.

RESEARCH

Dr. D.J. Alton is carrying out research into Cockayne's Syndrome.

Dr. B.L. Bird and others are developing a procedure for studying strictures in the adult male urethra. The study is continuing with further evaluation of the anatomic landmarks of the normal male urethra.

Dr. R. Blend and others have been investigating techniques of transverse axial tomography. This has resulted in improved methods of examination of the mediastinum and the development of a new method of demonstration and positioning of neoplastic lesions within the skull.

Dr. J.E. Campbell is carrying out research into follow-up studies on the effect of partial obstruction of the ureter, long-term follow-up on polycystic kidneys, and renal osteodystrophy in kidney disease and renal transplantation.

Dr. W.A. Cumming is carrying out research into the following: giant cell tumours of bone in children; congenital abnormalities of the temporal bones; idiopathic juvenile osteoporosis; evaluation of a method of estimating bone mineral content *in vivo* in children.

Drs. J.W. Davidson, E.A. Clark, and D. Rideout have carried on from previous years research into lymphology.

Dr. J. Halls is continuing a radiological-pathologic review of specimens of Crohn's disease in the colon. With others he has pursued an investigation of various methods of colon preparation for barium enema, and his work has culminated in a change in recommended standard colon preparation. Dr. Halls and others are undertaking a double blind study on the effects of imuran on Crohn's disease.

Dr. D.C.F. Harwood-Nash is carrying out research into the following: axial tomography of the optic canals in children – normal parameters and abnormalities, particularly in optic glioma; the subtraction cerebrogram; acquired cerebral arterial disease in children, with Dr. P. McDonald; a study of 200 mass lesions of the spinal canal in children; a new syndrome of a single prolapsed vertebra in children; giant infantile cerebral abscesses – their specific radiology and their demonstration by barium; the effects of achondroplasia on the cerebral structures; the syndrome of the Klippel-Feil anomaly, encephalocele, Arnold-Chiari malformation, cleft palate in females; the radiography of extradural hematomas in children; the radiography of brain stem tumours in children; the anatomy of the basal cisterns and their contents in pneumoencephalography with tomography.

Dr. J.N. Harvie is carrying out a 25-year follow-up on ankylosing spondylitis as well as research into fractures in the region of the neck of the femur.

Dr. A. Humphry is involved in research in the following: thickening of the cranial vault in cyanotic heart disease, with Dr. Reilly; partial duodenal obstruction of the

infant due to abdominal fixation; pathogenesis and radiographic manifestations of small bowel intussusception in children; coronal clefts in lumbar vertebral bodies in phenylketonuria.

Dr. P. McDonald is studying angiographic techniques in childhood – materials, methods, and risks; abdominal tumours; vascular lesions in childhood; arterial hypertension in childhood (review), with Dr. W.A. Cumming; the role of angiography in suspected abdominal tumours in childhood, with Drs. H.G. Hiller and H.C. Kennedy, Australia; genito-urinary tumours, and retroperitoneal tumours in childhood.

Dr. J.L. McIntyre is studying pseudo-spondylolisthesis of the lumbar spine producing claudication of the cauda equina, and is pursuing his double contrast studies of the normal and abnormal knee joint as well as his evaluation of linear tomography in the evaluation of congenital ear abnormality.

Dr. H.T.G. Ma is carrying out research into the radiological study of the pharynx and larynx, dynamic and static, and a comparison of bronchography with aqueous and oily Dionosil.

Dr. E.N.C. Milne is continuing his work on magnification radiology, studies of pulmonary extravascular water, the impedance pneumograph, and with his associates is beginning studies on lymph node micro-angioarchitecture.

Dr. C.A.F. Moes is carrying out research into the evaluation of the types of atrial septal defect by selective left atrial angiocardiology. With others he is studying the significance of the right atrial bump in the angiographic diagnosis of tricuspid atresia; clinical and radiological evaluation of tracheal compression by the innominate artery in infancy and childhood; and a report of three cases of thoracopagus twins seen at the Hospital for Sick Children, including the angiocardiological findings.

Dr. B.J. Reilly is studying “bubbly” patterns in the newborn with respiratory distress – an assessment of their significance, and with others is studying hereditary abnormalities in mucopolysaccharide excretion associated with skeletal defects; pulmonary function 6–8 years after recovery from RDS; cardiomegaly in association with neonatal hypoglycaemia; the correlation of radiological changes with pulmonary function in cystic fibrosis; an unusual manifestation of pulmonary histiocytosis X; roentgen manifestations of GM₁ gangliosidosis and an osteomyelitis study.

Dr. P. Samu, with others, is reviewing cine coronary arteriograms.

Dr. D.E. Sanders, with Dr. C.R. Woolf, is continuing to study the effects of smoking in women.

Dr. J.R. Standen is studying certain aspects of coronary arteriography and angiocardiology as well as radiographic features of various makes of cardiac pacemakers.

Dr. D.W. Swales is carrying out research into the anatomy and pathology of middle and inner ear diseases.

Dr. P.C. Thorfinnson is studying the effect of acidified barium solutions on the function of the esophagus and stomach.

HONOURS

DR. D.C.F. HARWOOD-NASH was Visiting Professor in Radiology to the Department of Radiology, University of California, Los Angeles. He was invited as a Faculty member to the Second Pediatric Neuroradiological Symposium, North-Western University, Chicago.

DR. R.B. HOLMES was named treasurer and director of the Radiological Society of North America. He was also named chairman of the Board of Directors, Ontario Medical Association.

DR. E.N.C. MILNE was named first secretary-treasurer (and founding member) of the Fleischner Society.

DR. B.J. SHAPIRO was invited to be guest editor of the University of Toronto *Medical Journal*, Radiology issue.

SCHOLARLY ADDRESSES

W.E.C. ALLT, "Supervoltage Radiotherapy of Advanced Carcinoma of the Cervix," 51st Annual Meeting, American Radium Society, Philadelphia, Pa., and National Congress of Oncology, Bucharest, Rumania.

D.J. ALTON, "The Role of Brain Scanning in Post-Operative Pediatric Tumors," Holmes Society Meeting, Muskoka, Ontario.

R.S. BUSH, "Biological Basis of Radiation Therapy," 2nd Clinical Cancer Research Conference, sponsored by the Ontario Cancer Treatment and Research Foundation, Lake Couchiching, Ontario, and 18th Annual Meeting of the Radiation Research Society, Dallas, Texas; "The Growth Kinetics of Solid Tumors," Williamsburg, Virginia; "The Kinetics of Cell Reproductive Inhibition," 4th International Congress of Radiation Research, Evian, France.

JOHN CAMPBELL, "Renal Osteodystrophy before and after Kidney Homotransplantation," XIth International Congress of Radiology, Tokyo, Japan; "An Approach to Lumps and Bumps in the Kidney," "Differential Diagnosis of Calyceal Papillary Disease of the Kidney," and "Radiological Approach to Renovascular Hypertension," as Visiting Lecturer, Department of Radiology, University of Alberta, Edmonton.

R.M. CLARK, "Management of External Radiation Casualties, Canadian Forces Medical Training Centre, Camp Borden, Ontario.

W.A. CUMMING, "Congenital Abnormalities of the Temporal Bone," an exhibit, Radiological Society of North America, Chicago; "Giant Cell Tumours of Bone in Children," Holmes Society, Muskoka, Ontario.

J.W. DAVIDSON, "Lymphography and Clinical Staging of Hodgkin's Disease," Vanderbilt University, Nashville, Tennessee; (with E.A. Clark), "Radiographic Features of Hodgkin's Disease," Canadian Association of Radiology, Montreal; (with E.A. Clark), "Further Evidence for Two Distinct Entities in Hodgkin's Disease," Canadian Association of Radiology, Montreal; "Clinical Applications of Lymphography," York Central Hospital Grand Rounds; "New Evidence for Two Entities in Hodgkin's Disease," Toronto Society for Clinical Research.

P.J. FITZPATRICK, "Refresher Course on Treatment of Malignant Lymphomas," American Roentgen Ray Society, Washington, D.C.; "The Nasopharyngeal Angiofibroma," Symposium on Head and Neck Cancer, 12th International Congress of Radiology, Tokyo, Japan.

J.H. GARDINER, "A Venographic Study of the Incidence and Location of Venous Thrombosis in Patients with a Fractured Hip. The Effect of Prophylactic Anticoagulation," the Canadian Association of Radiologists, Montreal.

D.C.F. HARWOOD-NASH, "Subtraction in Radiology," Annual Meeting of the Alumni Association, the Hospital for Sick Children, Toronto; "Axial Tomography of the Optic Canals in Children," Radiological Society of North America, Chicago; "Axial Tomography of the Optic Canals, Revisited," and "Rhabdomyosarcomas of the Middle Ear in Children," Holmes Society, Muskoka, Ontario; "Axial Tomography of the Optic Canals in Children," Canadian Association of Radiologists, Montreal; "Fractures of the Petrous and Tympanic Bones in Children. A Tomographic Study of 35 Cases," Canadian Association of Radiologists, Montreal and Pediatric Neuroradiological Symposium, North-Western University, Chicago, March 1970 (Faculty member by invitation); "Axial Tomography of the Optic Canals and Optic Gliomas in Children," American Association of Neurological Surgeons (Harvey Cushing Society), Washington, D.C.; "Acquired Cerebral Arterial Disease in Children: An Angiographic Study of 40 Cases," Association of University Radiologists, Lexington, Ky.; "Acquired Cerebral Arterial Disease in Children," Canadian Congress of Neurological Sciences, Toronto.

A. HUMPHRY, "Partial Duodenal Obstruction of the Infant due to Abdominal Fixation," Canadian Association of Radiologists, Montreal.

R.D.T. JENKIN, "Ewing's Sarcoma," Annual Meeting, Radiological Society of

North America, Chicago, Ill.; "Management of Wilms' Tumour," Annual Meeting, Canadian Association of Radiologists, Vancouver, B.C.; "Specific Problems in Childhood Cancer," 10th International Congress of Radiology, Houston, Texas; "Whole Body Irradiation, Clinical Sequelae and Treatment," Biological Warfare Course, Canadian Forces Medical Training Centre, Camp Borden, Ontario.

R.A. LOBB, "The Lateral Look," the American Life Convention, Medical Directors of North American Life Insurance Companies, Hot Springs, Virginia.

P. McDONALD, "I. Angiographic Techniques in Childhood – Materials, Methods and Risks. II. Abdominal Tumours. III. Vascular Lesions in Childhood," Postgraduate Course on Practical Pediatric Radiology, Williamsburg, Va.

J.L. MCINTYRE, "The Lateral Meniscus of the Knee, Normal and Abnormal," Workmen's Compensation Board of Ontario.

M.J. McLoughlin, "Coexistence of Aortic Valve Disease and Coronary Artery Disease," Canadian Cardiovascular Society Meeting, Quebec City.

D.L. McRAE, "Atrophic and Hypoplastic Lesions of the Brain," "Anomalies of the Craniovertebral Junction and of the Spine and its Contents," and "Injuries to the Cervical Spine and Spinal Cord," New York University Post-Graduate Medical School.

H.T.G. MA, "The Radiological Signs of Recurrent Laryngeal Nerve Paralysis," Meeting of the Canadian Association of Radiologists, Montreal.

H.E. MEEMA, "Metabolic Bone Diseases: Newer Concepts and Diagnostic Aspects," the Radiological Society of North America, Chicago; "Simple Radiologic Demonstration of Cortical Bone Loss in Thyrotoxicosis," the Royal College of Physicians and Surgeons of Canada, Montreal; "Bone Mineral Mass, Density and Cortical Thickness in the Radius in Chronic Renal Disease," Toronto Connective Tissue Club; "Metabolic Bone Diseases (I. Basic Considerations and II. Radiodiagnostic Aspects)," Department of Radiology, University of Wisconsin; "Changes in Bone Mineral Content of Radius in Chronic Renal Disease," Bone Mineral Measurement Conference, Chicago, Ill.

E.N.C. MILNE, "The Radiology of Health Failure," Harvard Medical School, Peter Bent Brigham Hospital, Boston, Mass., Advances in Cardiology course; "Lung Manifestations of Lupus Erythematosus and Rheumatoid Arthritis," Harvard Medical School, Peter Bent Brigham Hospital, Boston, Mass.; "Mediastinal Masses, Isolated Pulmonary Lesions and Interstitial Disease of the Lung," Harvard Medical School, Peter Bent Brigham Hospital, Boston, Mass.; "The Distribution of Pulmonary Blood Flow in Heart Failure, Mitral Stenosis and Uremia," Harvard Medical Society, August 1969; "Tumour Circulation in Man and the Experimental Animal," Harvard Medical School, Seminar Series in Cell Biology, Shields Warren Radiation Research Institute, Boston, Mass., August 1969; "Derivation of Pulmonary and Cardio-pulmonary Function from the Plain Chest Radiograph," Toronto Radiological Society; "Interstitial Disease of the Lung," Harvard Medical School, Veteran's Administration Hospital, West Roxbury, Mass.; "Radiologic Assessment of Pulmonary Function," Tufts University, Boston, Mass.; "The Radiologist, the Physiologist and the Chest X-ray," "Image Formation in Relation to Magnification Techniques," Dalhousie University, Halifax, N.S.; "Radiological Detection and Quantitation of Interstitial Fluid in the Lungs," Radiological Society of North America, Chicago, Ill.; "X-ray Diagnosis of Emphysema," "Dynamic Interpretation of Chest X-rays," and "The Geometry of Image Formation in Primary Roentgenologic Magnification," University of Colorado Medical Center, Denver General Hospital, Denver, Colorado; "Radiological Diagnosis of Early Lung Disease," "Mechanisms of Distribution of Pulmonary Blood Flow," and "Magnification Radiology," Radiological Division of the Kentucky Medical Association Annual Meeting, Lexington, Kentucky.

M.V. PETERS, "Carcinoma of Breast, Pre- and Post-operative Radiation," 3rd Annual Cancer Symposium, California Medical Association and Pasadena Tumour Institute, Pasadena, California; "Hodgkin's Disease," Dedication Conference, University of North Carolina, Chapel Hill, N.C.; "Management of Hodgkin's Disease," Hodgkin's Disease Workshop, Georgia Medical Society, Atlanta, Georgia; "Manage-

ment of the Lymphomas," Cancer Colloquium, Munson Medical Society, Travers City, Michigan; "Clinical Course Therapy in Hodgkin's Disease," Beth Israel and Mount Sinai Hospital, New York; "Changing Concepts in Radiotherapy for the 'Lymphomas,'" 14th Annual Clinical Conference on Cancer, University of Texas, Anderson Hospital and Tumour Institute, Houston, Texas; "Hodgkin's Disease," University of Cincinnati, Cincinnati, Ohio; "Teaching Symposium," University of Chicago, School of Medicine, Chicago; "Historical Prospective," M.D. Anderson Hospital and Tumour Institute, 10th International Cancer Congress.

B.J. REILLY, "Cardiomegaly in Association with Neonatal Hypoglycemia," Society for Pediatric Radiology, Washington, D.C.; "The Correlation of Radiological Changes with Pulmonary Function in Cystic Fibrosis," Radiological Society of North America, Chicago, Ill.; "An Unusual Manifestation of Pulmonary Histiocytosis X," and " 'Bubbly' Patterns in the Newborn with Respiratory Distress. An Assessment of their Significance," Canadian Association of Radiologists, Montreal.

W.D. RIDER, "A Trial of 'Orthobaric Oxygen' as an adjunct to Radiotherapy of Bladder Cancer," 5th Scientific Assembly, Radiological Society of North America, Chicago, Ill.

D.E. SANDERS, "Newer Techniques in Diagnosis of Pulmonary Disease," Guest speaker, Buffalo Radiological Society; "Complications in Angiography," Holmes Society; "Roentgen Signs in Pulmonary Vascular Disorders," Western Ontario Section of Canadian Association of Radiology, London, Ont.; "Some Aspects of Aspiration Lung Biopsy," Canadian Medical Association, Winnipeg, Man.

W.J.K. SIMPSON, "Fractionation Study in Patients suffering from Glioblastoma Multiforme," Meeting on Time and Dose Relationships in Radiation Biology as Applied to Radiotherapy, Carmel, California; "Advances in Cancer Diagnosis," Chapter #3, OHA Medical Records Librarians, Kincardine, Ontario.

J.R. STANDEN, "The Radiologist and the Cardiac Pacemaker," Meeting of the Canadian Association of Radiologists, Montreal.

D. SWALES, "The Diagnosis of Labyrinthine Fistulae without a Polytome," Meeting of the Canadian Association of Radiologists, Montreal.

PUBLICATIONS

- ALLT, W.E.C. "Supervoltage Radiation Treatment in Advanced Cancer of the Uterine Cervix. A Preliminary Report" (*Canadian Medical Association Journal*, vol. 100, 1969, p. 792).
- "Tratamentul Radiant Prin Supravoltaj al Cancerului Avansat al Colului Uterin" (*Oncologia si Radiologia*, vol. 9, nr. 1, anul 1970).
- BUSH, R.S. *et al.* "A Lung-Colony Assay to Determine the Radiosensitivity of the Cells of a Solid Tumour" (*International Journal of Radiation Biology*, vol. 15, 1969, p. 435).
- BUSH, R.S. and ASH, C.L. "Primary Lymphoma of the Gastrointestinal Tract" (*Radiology*, vol. 92, 1969, p. 1349).
- CUMMING, W.A. "Idiopathic Juvenile Osteoporosis" (*Journal of the Canadian Association of Radiologists*, vol. 21, 1970, pp. 21-6).
- DAVIDSON, J.W. (with FUCHS, W.A. *et al.*) *Lymphography in Cancer*. Berlin/Heidelberg/New York: Springer-Verlag, 1969. Pp. 294.
- FITZPATRICK, P.J. *et al.* "Adjuvant Chemotherapy in Primary Treatment of Breast Cancer" (*Radiology*, vol. 93, 1969, p. 423).
- GARDINER, J.H. *et al.* "Venous Thrombosis after Fractures of the Upper End of the Femur" (*Journal of Bone and Joint Surgery*, vol. 52-B, 1970, pp. 61-9).
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SURGERY

Under the direction of Professor W.R. Drucker

The many members of Faculty who worked so hard to introduce the clinical clerkship are rewarded by evidence that at the end of the first year in operation it is a going concern. Students clearly appreciate the opportunity to observe at first hand the vicissitudes of illness and the response to injury, from hour to hour, day after day. Their experience was made more meaningful by the assignment of responsibilities for care of patients. Incorporation of students into a team of residents created a preceptorial environment that promoted a rapid maturation of self-confidence. From this experience students gained a better understanding of the problems which confront surgeons and a healthy penetrating insight into surgeons as personalities. Hopefully, most students departed with fewer illusions about the myths and mysteries attendant upon an operative procedure, and they substituted for this an appreciation that a better understanding of mechanisms of disease can be derived from careful, critical, and frequent observation of surgical patients.

But certain, and perhaps inevitable, problems developed which were applicable in variable degree to all sections of the clerkship. Not infrequently students were required to perform a seemingly unwarranted amount of service work. Expression of this concern was largely proportional to the lack of interest in undergraduate education exhibited by residents and faculty. This reflected to a considerable extent a lack of awareness by faculty of the objectives of the clerkship and of their responsibilities in the clerkship. Also, a serious misconception was promulgated among students that service work has no educational merit. The formal sessions to present material for a core curriculum for all final year students frequently distracted the clerks from their responsibilities in the clerkship. Many of the films that were prepared for these sessions were acknowledged as being exceptionally well done. Clearly, an unsolved problem for the faculty is the organization of a realistic and acceptable final-year core curriculum. An equally compelling and broadly proclaimed problem is the growing student dissent regarding current methods of evaluation. Now that students have a closer affiliation with patients, an evaluation more directly related to their performance in a clinical situation is strongly urged.

In order to co-ordinate the clerkship programmes in the several hospitals and to facilitate changes that faculty or student opinion deem necessary, a departmental committee was established under the chairmanship of Dr. John Palmer with representatives in each of the teaching hospitals.

Under the leadership of Dr. Owen V. Gray the residency programme must face several difficult and urgent problems. The recent commendable change, instigated by the Royal College, to place all residency education under University aegis has increased the requirements for residency positions. This has occurred at a time when government resources to support residency education have been curtailed. There is a clear mandate from government to harmonize the objectives of residency education with the needs of society.

The introduction, in 1970, of a first postgraduate year confined to surgery, and the trend to organize a core surgical experience for all branches of surgery, add variables that should promote greater flexibility for planning in residency education. Additional problems under active study include: inservice examinations for residents; evaluation of faculty performance in residency education; the adequacy of clinical experience and graded responsibility for residents; the role of research in residency education; and the responsibility of residents in the undergraduate programme of education. Fortunately, the continuing plethora of highly qualified applicants insures that the residency programmes in the many surgical specialties will continue to be filled with individuals who expect and will respond to the optimum of educational experiences.

The continuing delay in construction of research facilities in the many hospitals is a chronic source of distress and frustration for those who wish to conduct clinical investigation. The detrimental effect of this deficiency in research on both graduate and undergraduate programmes of education can never be fully appreciated. But the research activities of the department have been materially assisted by the accommodations provided in the new Medical Sciences Building. Proximity to other investigators in an environment with overt dedication to inquiry has been a stimulating and rewarding experience for the many surgeons who are now actively pursuing research in the building. To facilitate the development of research, an interhospital co-ordinating committee was established under the chairmanship of Dr. Walter Zingg.

Support for research from government agencies continues to be thoroughly inadequate. The generous support of many private agencies and individuals has been essential for the initiation of new programmes by young investigators as well as for the continuation of several well-established research projects. In recognition that clinicians are frequently compromised in their conduct of research because they lack formal instruction in investigative work, an increasing number of young faculty members have undertaken additional education of one to three years' duration. Support for these years has been provided in the past almost exclusively and most generously by the McLaughlin Foundation. Presently nine young surgeons who have completed their

residencies are working with experienced investigators in other universities to obtain the skills and background that will enable them to couple investigative work with continuing clinical activity after their return to this University. Support for these individuals is currently provided by the Medical Research Council (3), the McLaughlin Foundation (2), Ontario Government (1), U.S. universities (2), and local hospital (1). It is discouraging to note that prospects for space for the new investigators to conduct their research and for the financial support of their faculty positions are not overly optimistic. Unless adequate support for salary and research can be provided for these individuals, many of whom have long-standing commitments, the opportunity for them to pursue their intended investigations will be compromised. Loss of these investigators would be detrimental to the fruition of the new curriculum which is predicated, in large measure, upon the development of a faculty with a continuing interest in a study of mechanisms of disease.

RESEARCH

Cardiovascular Surgery (Dr. W.G. Bigelow, Chairman)

Dr. R.J. Baird has continued his laboratory research in myocardial revascularization, measurement of intramyocardial pressure, and mechanical support of the circulation. Clinical research has continued in myocardial revascularization and surgery of the ischaemic heart. Dr. W.G. Bigelow, with the assistance of Dr. Harold Aldridge of the Department of Medicine, has continued his follow-up studies of internal mammary artery implantation for coronary artery disease; with the assistance of Dr. V.K. Saini he has written a detailed study of the causes of death in open heart surgery; in co-operation with Dr. B.S. Goldman, in a combined research project with Drs. J. Crookston and K. Shumak of the Department of Medicine and Dr. M.D. Silver of the Department of Pathology, a detailed study of the immunological aspects of heart transplantation has continued. This is a combined experimental and clinical approach. Dr. B.S. Goldman has studied the effect of glucagon upon myocardial metabolism and coronary blood flow; this work has been carried out with the assistance of Dr. C.K. Gorman. He has studied rejection in the canine cardiac allograft with special reference to the cellular and humoral immune response. The effect of heterologous antisera on the recipient heart, the effect of immunosuppression on antibody development, and the effect of presensitization on the rejection of the cardiac allograft is under study. Clinical research is directed toward the development of a pacemaker clinic for the accurate follow-up and management of patients with implanted pacemakers. Dr. R.O. Heimbecker continues his studies of decompression sickness; *in vitro* studies have tended to confirm the previous suggestion that the cause of fluid shift to the extra-vascular compartments is caused by the upset of osmotic equilibrium with high osmotic pressure exerted by the high concentration of dissolved nitrogen in the extra-vascular tissues, during the period of rapid decompression. He has studied left ventricular function in the heterotopic transplanted heart in calves and dogs; studies to date have shown a very consistent early deterioration of left ventricular function as rejection occurs, appearing long before the well-known changes in the electrocardiogram. The effect of immunosuppressive therapy upon this deterioration curve is now being studied. In collaboration with Dr. I. Koven and Dr. S. Teasdale of the Department of Anaesthesia he is studying fluid shifts during open heart surgery and has consistently demonstrated a marked shift to the vascular compartment. They are now studying the changes with the improved tissue perfusion created by simultaneous Rogitine therapy. Changes in Kallikrein metabolism with experimental myocardial infarction are being studied in the laboratory based on the premise that bradykinins may be released from ischaemic heart muscle. Dr. W.T. Mustard has concluded his studies on the use of pedicle diaphragmatic graft to replace the heart wall. Studies have been complicated by diaphragm fatigue which is not capable of producing sufficient contractile force to duplicate that of heart wall, although the treatment could be applicable to myocardial

infarction. Dr. G.A. Trusler continues his studies of the state of homograft and heterograft valves as well as pericardial cusps as implanted in the pulmonary area of calves. Studies are continuing on the relative effects of pulmonary valve insufficiency and pulmonary stenosis upon the haemodynamics in dogs. Dr. A.S. Trimble is studying myocardial oxygen availability in clinical open heart surgery. In co-operation with Dr. Jan Kryspin of the Institute of Bio-Medical Engineering he has developed a platinum electrode which appears useful in predicting the safe period of anoxic arrest. Dr. J.K.Y. Yao is studying the effect of an atrial pedicle graft in the management of complete heart block. He is studying cardiogenic shock produced by serial ligation of coronary arteries and then determining the effects of counter-pulsation techniques to improve haemodynamic survival rates. Clinical research is concerned with follow-up of patients who have had previous coronary arteriography and in noting their subsequent incidence of myocardial infarction. He is also reviewing 180 patients who have previously undergone closed repair of the mitral valve and is comparing the results obtained with open valvotomy. Experimental heterotopic cardiac transplantation is being studied for comparison of physiological data in a control group and a similar group receiving immunosuppressive therapy. Dr. J.T. Hart is studying methods of coronary artery reconstruction; theoretical studies in haemodynamics; techniques and problems in microvascular surgery.

General Surgery (Dr. E.B. Tovee, Chairman)

Clinical and laboratory research studies are playing an increasingly important role in the specialty of general surgery. Dr. Donald Currie is continuing his research in an attempt to produce cholelithiasis in experimental animals. In the same general anatomical complex Dr. J.P. McKenna and he are working on experimental pancreatitis. Dr. W.R. Drucker and Dr. G. Farago are studying metabolic alterations produced by hypovolemic shock. Particular attention has been directed to changes in fat and carbohydrate metabolism. Dr. Rudy Falk has returned from Sweden and has a well-integrated group of projects in full swing. These include: the assessment of lymphocyte mediated immune response; the study of thymocytes *in vitro*; an assessment of lymphocyte reactivity; and other important studies dealing with tissue antigens. In collaboration with Dr. B. Langer, studies of hepatic transplantation have been initiated. Dr. E.B. Fish is doing clinical studies on the relationship of mammary dysplasia to breast cancer. Dr. I.H. Koven is working on the transplant characteristics of interstitial fluid during low flow states and the use of salt solutions as adjuvant therapy following major operations. An interesting problem is under investigation by him and deals with antigen antibody complexes in carcinoma of the colon. Dr. L.J. Mahoney continues with his active interest in the field of tetanus. Dr. R.E. Mathews is currently studying plasma volume and extracellular fluid volume in cardiogenic shock in dogs, together with a clinical project on extracellular fluid volume changes in elective surgical patients. Dr. J.A. McIntyre is studying intravenous alimentation, the clinical significance of abnormal positions of CVP catheters, and the clinical problem of bolus food obstruction following partial gastrectomy. Dr. R.I. Mitchell has completed his work in the rejection of lung transplants. Dr. J.E. Mullens has carried out investigation on the use of revascularized segments of intestine to replace the cervical oesophagus and this work is proceeding. Dr. J.L. Provan is currently studying the prophylaxis of deep vein thrombosis in postoperative surgical patients. Dr. H.F. Robertson, together with Professor Serge Dmitrevsky, is developing a method for the measurement of transthoracic electrical impedance, with a view to study of pulmonary insufficiency and early pulmonary oedema. Dr. I.B. Rosen is studying the technical feasibility of human pancreatic transplantation. Dr. Barry Shandling is performing liver transplants, using a vascular stapling device, as well as studying extracorporeal hepatic perfusion. A clinical review and follow-up of surgically treated children with hiatus hernia has been completed. Dr. W.J.E. Spence, together with Dr. J. Waddell, has reported on a clinical study of patients suffering from gas infections and the current status of hyperbaric chamber therapy in their treatment. Dr. Spence has started a biochemical investigation of gall

stones. Dr. V. Taubenfligel is investigating techniques of studying fluid and electrolyte problems following major surgery. Dr. E.B. Tovee has completed a study of motorcycle injuries, and is currently undertaking a long-term follow-up of a large series of operations for peptic ulcer performed by one individual. Dr. Walter Zingg continues his interest in research in many subjects. These include the Membrane Oxygenator, the biorheology of blood, hypothermia, and experimental foetal surgery.

Neurosurgery (Dr. T.P. Morley, Chairman)

The Irene Eleanor Smythe Pain Fund has supported the following research activities: stimulation mapping of the human thalamus (R.R. Tasker); percutaneous cordotomy and thalamotomy for pain (R.R. Tasker); epidemiology of intractable pain and the influence of metabolic alkalosis in increasing the severity of pain (R.J. Evans); the role of c-fibre activity and its central connections in pain productions (R.G. Vanderlinden). Dr. C.H. Tator continues his research into the diagnosis and chemotherapy of brain tumours. He has also begun a clinical investigation, to be supported by laboratory studies, into the effect of local hypothermia, steroids, and diuretics on spinal cord trauma. Dr. H.J. Hoffman has studied the effects of steroids on cerebral oedema by labelling dexamethasone with tritium to ascertain its site of action. Dr. K.E. Livingston, with Dr. Charles Hockman of the Department of Pharmacology, continues his study of central modulation of autonomic reflex activity. Dr. Robert Tym is working on gamma efferent control and spasticity. Dr. J.F.R. Fleming is investigating cerebrospinal fluid dynamics with intrathecally administered radioactive tracers.

Orthopaedic Surgery (Dr. F.P. Dewar, Chairman)

Research in the Division of Orthopaedic Surgery is particular to each of the large postgraduate training units in both the major teaching hospitals and the affiliated hospitals. It is co-ordinated by an orthopaedic research committee representing all the units and chaired by Dr. Ian Macnab. Dr. R.B. Salter is making experimental investigations of various intra-articular drugs and their effects on articular cartilage and synovial membrane (with the assistance of Dr. Donald Prior); the factors in the prognosis of Legg-Perthes' Disease (with the assistance of Dr. Richard MacArthur); the natural course of Blount's Disease and Osgood-Schlatter's Disease (with the assistance of Dr. Trevor Best); the first ten years personal experience with innominate osteotomy in the treatment of congenital dislocation of the hip (with the assistance of Dr. Jean-Pierre Dubos). Dr. J.E. Hall is continuing a programme of study in the Prosthetic Research Training Unit of the Ontario Crippled Children's Centre; a follow-up study of 235 cases of idiopathic scoliosis, postoperative; the development of a new operative procedure for hyperlordosis of the spine; a study of pulmonary physiology in scoliosis (with Dr. H. Levison); the genetic aspects of scoliosis (with Dr. Thompson and Dr. Alvez); microscopic studies in scoliosis (with Dr. P. Conen). Dr. W.P. Bobechko is studying the reactions of articular cartilage concerning rejection responses, septic arthritis, and transplantation; the investigation of the inflammatory response in Legg-Perthes' Disease by lymphangiography; an investigation of the treatment of scoliosis in children with spina bifida, and also the designing of new braces for children with spina bifida and cerebral palsy. Dr. Mercer Rang is making a basic research study on anatomy to determine the axis of the subtalar joint; a study to determine new methods of treatment for patients with cerebral palsy affecting the upper extremities; a case study to determine the mode of production of subacute diaphyseal osteomyelitis in children. Dr. R.W. Jackson is making biomechanical studies of intact bone and healing fractures; an *in vitro* and *in vivo* study of the toxicity and possible carcinogenic effects of zinc polycarboxylate, a new "cement" for biological purposes, prior to clinical trials of this new plastic material; the effect of electromagnetic energy (microwave band) on biological tissues. Dr. W.R. Harris (in association with J.P. Kostuik, G. Wooldridge, and O. Schmidt) have devised an apparatus for the *in vitro* testing of force transmission through cadaveric knee joints, and have made a detailed investigation of the epidemiology of industrial amputations with a view to improving present techniques for accident

prevention. Dr. J.D. Graham has established a liaison with the Engineering Faculty to allow continuing studies of the mechanism of load transmission and lubrication of articular cartilage. Maps of the fibre direction of articular cartilage are being prepared, and these will be correlated with the mechanics of the material and its lubrication. Dr. J.P. Kostuik has completed a biomechanical study of the effect of deformity of the lower extremities on weight transmission through the knee joint; a study of the feasibility of intraosseous implantation of external prosthetic devices and its possible application to the human amputee; a study of forces transmitted during the stance phase of gait in lower extremity amputees. Dr. Ian Macnab is making studies of: the tensile strength of tendons; the use of ceramic as an implant material; slurry coating of vitalium to induce biological bonding of metal to bone; the pathogenesis of the anterior compartment syndrome; the effects of loss of apposition of articular cartilage; a follow-up of the results obtained for surgical repair of tears of the rotator cuff; intra-articular pressure determinations as an aid to assessing the size of rotator cuff tears; the value of intradiscal injections of Chymopain in the treatment of herniations of lumbar intervertebral discs. Dr. D.E. Hastings is making studies of: fractures of the greater tuberosity of the humerus; various surgical methods of treatment for rheumatoid arthritis; rheumatoid hand deformities made to develop an anatomical and functional classification. This study resulted in a movie for teaching purposes. Dr. Joseph Schatzker is making studies of: the healing of experimental osteotomies of tubular bones with periosteal interposition, immobilized rigidly under compression; the response for articular cartilage to bone cement used as replacement for subchondral bone; the heat of polymerization of bone cement; tension band fixation of experimental olecranon osteotomies; the healing of experimental osteotomies of the odontoid in the dog; clinical survey of fractures of the odontoid; rigid internal fixation as an aid in the rehabilitation of fracture dislocations of the ankle joint. Dr. A.M. Wiley is studying transplantation of cartilage in joints; a clinical study of the end results of arthroplasty of the hip. Dr. J.G. Evans is continuing a decade clinical study of the incidence of the fractured neck of the femur in the elderly; continuing follow-up of total hip replacement; a study of the association of apophyseal joint disease in degenerative spinal disease; a study of the use of hinged orthotic appliances in the treatment of lower-limb fractures. Dr. E.H. Simmons is studying the serological changes noted in response to the treatment of tumours by cryosurgery in conjunction with the Department of Haematology and in association with Drs. R.A. Green, H.M. Coleman, T.W. Barrington, and D.C. Evans; a biomechanical study of a scoliosis simulator to determine various techniques of anterior and posterior spinal instrumentation (in conjunction with Dr. E.A. Sue-e-Quan and Mr. H. Garside); a Ceuze Pennel study of the cortical evoked response after stimulation of the sural nerve and craniotomy to expose the brain (associated with Dr. D. Petrie); a continued observation of the clinical evoked response in patients with nerve root lesions (in association with the Department of Neuro-Pharmacology, Dr. Charles Hockman, and Mr. Dennis Priebe); a study of fractures of both bones of the forearm treated by rigid compression techniques; a clinical study of patients with Secretin's disease.

Plastic Surgery (Dr. W.K. Lindsay, Chairman)

Dr. James Murray is continuing a detailed study of the sensory changes in the hand, following neurovascular island pedicle flaps. Dr. Murray and Dr. W.R.N. Lindsay are completing a clinical study on the end results following digital nerve injuries. Dr. W.R.N. Lindsay is carrying out a clinical study on the end results following combined median and ulnar nerve lesions in the forearm and hand. Dr. W.R.N. Lindsay and Dr. Leith Douglas, in collaboration with the Department of Surgery of the Ontario Veterinary College, Guelph, Ontario, are carrying out a basic study of limb re-implantation, with emphasis on homotransplantation. Dr. L.G. Farkas, working with Dr. A.W. Farmer and associates, is evaluating methods of tracheal replacement in dogs together with a study of the fate of composite grafts of auricular cartilage and buccal mucous membranes. Dr. Wm. A. Brown is doing a clinical study of interphalangeal

joint ganglia; a detailed clinical study of digital flexor tendon results; a long-term study of the temporo-mandibular joint. Dr. J.R. Birch is studying the metabolism of the burned animal in relation to ambient temperature and humidity; the use of homografts as a biological dressing; research on prophylactic antibiotics in burns is being conducted in conjunction with the Department of Bacteriology.

Thoracic Surgery (Dr. F.G. Pearson, Chairman)

The research activities within this department cover a wide range of fields. Dr. F.G. Pearson is continuing his study into the bronchial arterial circulation as it relates to transplantation of the lung. Studies during the past year have confirmed that the significant defect in gas exchanges following auto-transplantation of the canine lung is the result of bronchial artery denervation. A prospective study of tracheal injury following assisted ventilation is continuing. Dr. R.D. Henderson has studied the physiologic mechanisms of importance in preventing reflux at the gastroesophageal junction. From these studies, methods have been devised to calculate true sphincteric time and to quantitate relaxation within the gastroesophageal sphincter. Also under active investigation are the mechanisms involved in preventing reflux following Collis gastropasty. Variations in pleural pressures associated with pneumothorax are being studied in conjunction with the Department of Anaesthesia. The effects of bile and its constituents on the esophageal mucosa and esophageal musculature are being studied in conjunction with the Department of Medicine. Dr. G. Taylor of Sunnybrook Hospital is investigating platelet function (aggregation, release mechanism, etc.) in relation to shock and acute rejection seen with auto-transplantation. He is also studying perfusion of the kidney to gain a better understanding of the acute changes seen in both shock and acute rejection.

Urological Surgery (Dr. C.J. Robson, Chairman)

Research is going on in conjunction with the Department of Biomedical Electronics on the electrical stimulation of the denervated bladder under the direction of Dr. C.J. Robson and Professor Hans Kunov of that department. Dr. W.K. Kerr is carrying on investigation of the endogenous carcinogens in relation to bladder cancer. A retrospective study also is being done on urinary tract tuberculosis. Dr. Grant Farrow is carrying out two projects; one on the renal blood flow in the transplanted kidney following various methods of storage, the other on the effect of platelet suppression by anturan in the dog and the immunosuppressive effect of this drug in prolonging canine renal homotransplants. Dr. J.L.T. Russell has completed a follow-up on some 200 cases of urinary diversion and is about to complete a study on the prophylactic use of Sulpha in transurethral prostatectomies. Dr. V. Colapinto continues with his work in the perfusion of isolated kidneys. Dr. Robert Jeffs and Dr. Martin Barkin have two studies in progress: the first is the investigation of enhancement in relation to transplantation antigens; the second involves renal preservation by perfusion. The Division of Urology at HSC is also involved in the production of a model for chronic renal failure, in conjunction with the Metabolic Unit. This group have produced also a computerized protocol for the retrospective study of re-implantation for reflux and are continuing their study of urodynamics. Dr. J.T. Rankin and Dr. A. Keresteci are carrying out pressure and flow measurements during voiding in patients with recurrent cystitis, and are exploring the possibilities of the use of electronic stimulators for urinary incontinence. Dr. Gerald Ranking is studying ideal replacement of the ureter. This work was awarded the Prize Essay at the Canadian Urological Association Meeting in 1970. Dr. Peter Crassweller continues his studies on tissue culture in carcinoma of the bladder. Dr. Gerald Cook, in collaboration with Dr. G. DeVeber and the Department of Medicine, is studying renal osteodystrophies. The most satisfactory acknowledgments to the many agencies and individuals whose generosity have enabled members of the department to conduct research are the contributions to new knowledge briefly outlined in this report.

Support has been received from the following governmental agencies: Medical

Research Council, Ontario Heart Association, Department of Health, Ontario Cancer and Research Foundation, National Health, Department of University Affairs, Workmen's Compensation Board, Health Science Committee.

The generous donations of several private foundations and individuals is also gratefully acknowledged: A.B. Taylor Fund, Muscular Dystrophy Fund, Sunnybrook Clinic, Winthrop Laboratories, Nelson Arthur Highland Foundation, G.P. Bickell Fund, Bongard Leslie & Co., The Hospital for Sick Children, John and Mary Markle Foundation, Eaton Laboratories, Playfair Foundation, Bristol Myers, Neurological Contingency Fund, J.M. Connell Fund, Irene E. Smythe Fund, Adam Beck Fund, Seeger Fund, Atkinson Charitable Foundation.

HONOURS

DR. R.J. BAIRD, Lecturer, International Cardiovascular Society, Buenos Aires.

DR. W.G. BIGELOW, Honorary Fellow, Royal College of Surgeons (England); Visiting Professor, Harvard University and Massachusetts General Hospital; Guest Lecturer, University of Alberta, Department of Surgery.

DR. F.P. DEWAR, President, Canadian Orthopaedic Association.

DR. W.R. DRUCKER, Guest lectureships – Foothills Hospital, University of Calgary, Alberta; St. Joseph's Hospital, McMaster University, Hamilton, Ontario; Visiting professorships – Louisiana State University, Columbia University, Welsh National School of Medicine, Middlesex Hospital Medical School; Chairman, Committee on Relationships with Young Surgeons, American College of Surgeons; elected Fellow, Royal College of Physicians and Surgeons of Canada.

DR. R.E. FALK, Centennial Fellow; Special Lecturer, University of Alberta.

DR. R.O. HEIMBECKER, Visiting Professor, University of Miami, University of Newcastle-upon-Tyne, University of Utrecht; Guest Lecturer, Royal Infirmary, Edinburgh, Queens University Aesculapian Club, Southern General Hospital, Glasgow.

DR. A.R. HUDSON, Special Lecturer, Toronto Academy of Medicine.

DR. R.W. JACKSON, Travelling Fellow of the American, British, and Canadian Orthopaedic Associations. An extensive 7-week visit to 28 major orthopaedic centres in the United Kingdom.

DR. W.K. LINDSAY, President, American Association of Plastic Surgeons.

DR. I. MACNAB, Visiting Professor – New Zealand & Australia, Tulane University, Hospital for Special Surgery, New York, Ankara, University of Florida; Norwood Lecturer, New Zealand; Wallace & Mary Duncan Lecturer, Cleveland; Guest Lecturer, Detroit Academy of Orthopedic Surgery.

DR. T.P. MORLEY, President, Medico-Legal Society of Toronto.

DR. J.F. MURRAY, Guest Lecturer, University of British Columbia and B.C. Workmen's Compensation Board.

DR. W.T. MUSTARD, Howard Lilienthal Memorial Lecturer, Mount Sinai School of Medicine, City University of New York; Frank N. Wilson-Gordon B. Myers Lecturer, Michigan Heart Association, Detroit; Fellow, American Surgical Association.

DR. F.G. PEARSON, Visiting Professor, University of California at Los Angeles; Guest Lecturer, American College of Chest Physicians and the Colorado Trudeau Society 9th Mid-winter Chest Conference.

DR. C.J. ROBSON, Visiting Professor, Dalhousie University, Halifax; Guest Lecturer, New England Section of American Urological Association, Puerto Rico, New York Section of American Urological Association, New York City.

DR. R.B. SALTER, Gairdner International Award, 1969; Honorary Fellowship of F.R.C.S. (Glasgow); Vice-President (Surgery) of Royal College of Physicians and Surgeons of Canada; Peter Mack Memorial Lecturer, Johns Hopkins University; Michael Hoke & Hiram Kite Lecturer, Atlanta; Visiting Professor, University of Buenos Aires, University of Colombia at Bogota, Queen's University at Kingston; Guest Lecturer, Pan Pacific Surgical Association, Honolulu, National Defence Medical Center, Ottawa, Hospital for Special Surgery, New York City.

DR. J. SCHATZKER, Guest Lecturer, University of Tulane.

DR. E.H. SIMMONS, Guest Speaker, Royal Society of Medicine, London, England; Guest Speaker, Fifth Laurentian Rheumatology Conference, Quebec; President, Canadian Orthopaedic Research Society.

DR. R.R. TASKER, Guest Lecturer, Queen's University Neurology Seminar.

SCHOLARLY ADDRESSES

DR. M. BARKIN, "New Concepts in the Anatomy of Upper and Lower Urinary Tract: A Neonatal Study," Toronto Academy of Medicine, Section of Urology Meeting; "Transplantation and Immunological Enhancement," Canadian Medical Association; "Ectopic Ureterocele," Canadian Urological Association; "The Prune Belly Syndrome," Northeastern Section, American Urology Association; "Altering the Antigenicity of a Graft," Toronto Society for Clinical Investigation.

DR. W.G. BIGELOW, "Surgery of Coronary Heart Disease," Moynihan Lecture, Association of Thoracic Surgeons of Gt. Britain & Ireland; "Some New Concepts in the Surgical Treatment of Coronary Heart Disease," Harold L. Foss Memorial Lecture, Geisinger Medical Center; "Surgical Treatment of Coronary Heart Disease," Henry Jackson Memorial Lecture, New England Cardiovascular Society.

DR. J.R. BIRCH, "The Difficult Hemangioma," HSC Alumni Meeting; "The Management of Burns," Surgical Post-Graduate Refresher Course; "The Management of Birthmarks," Paediatric Refresher Course; "A Medical Travelogue through Asia and Africa," RNAO Banquet; "Problems in Medical Aid to Developing Countries," OMA.

DR. V. COLAPINTO, "Urethroplasty Repair of Strictures Extending Through the External Sphincter: Report on 25 Cases," Canadian Urological Association.

DR. D.J. CURRIE, "Management of the Critically Injured in the Hospital Emergency Department," Ontario Medical Association.

DR. N.C. DELARUE, "Water Safety in Canada," Central Council, Canadian Red Cross Society; "Recent Advances in the Management of Breast Cancer," Royal College of Physicians and Surgeons of Canada Regional Meeting, Port Arthur; "Paramedical Association Responsibility in Public Education Regarding the Health Hazards of Smoking," Ontario County Tuberculosis and Respiratory Disease Association; "Modern Aspects of Cancer Therapy," Canadian Medical Association; "The History of the Surgical Treatment of Tuberculosis," Canadian Thoracic Society; "Recent Changes in the Approach to Education Regarding Cigarette Smoking," Canadian Cancer Society, Ontario Branch; "Bronchogenic Carcinoma: Investigation and Treatment," Workmen's Compensation Board Conference on Chest Disease; "The Surgical Story in the Management of Pulmonary Tuberculosis," Ontario Thoracic Society; "Smoking and Hospitals," Ontario Hospital Association; "Indications for Modified Radical Mastectomy," Cleveland Surgical Society; "Breast Cancer and the Patient," Canadian Cancer Society, East York Unit; "Investigation of Patients with Lung Cancer," Society of Thoracic Surgeons, Atlanta, Georgia; "New Concepts in Mammary Carcinoma," Trafalgar Memorial Hospital, Oakville; "Diagnosis and Treatment of Cancer of the Lung," Lincoln County Medical Association, St. Catharines; "Cigarette Smoking and Air Pollution in Relation to Cancer," Canadian Cancer Society; "Exemplar Responsibility in Cigarette Smoking," Victoria County (Ontario) Tuberculosis and Respiratory Disease Association.

DR. W.R. DRUCKER, "Shock - Diagnosis and Management" and "Physiology of Shock," North Carolina Heart Association; "Symposia: Liver and Pancreas Injury" and "Endocrine Response," International Trauma Symposium, Washington, D.C.; "Pathophysiology of Shock," Brockville General Hospital; "Azathioprine - An Adjunct to Surgical Therapy of Granulomatous Enteritis," American Surgical Association, White Sulphur Springs, West Virginia; "Problems and Solutions for Graduate Surgical Education in Canada," Allen O. Whipple Surgical Society; "Management of Penetrating Wounds of the Abdomen," Postgraduate Seminar in Surgery, University of

Miami; "Metabolic Alterations that Occur with Hypovolemic Shock," Surgical Symposium, University of Calgary and Surgical Association of Louisiana; "The Use of Energy Substrates in the Treatment of Surgical Patients," American College of Surgeons; "Current concepts of Diarrhea," Welsh National School of Medicine, Cardiff; "Tolerance to Prolonged Hypovolemic Shock," British Surgical Research Society and Society of University Surgeons; "Ischemic Necrosis of Bowel without Thrombosis," Middlesex Hospital Medical School.

DR. S.H. EIN, "Ulcerative Colitis in Children," St. Joseph's Hospital, Hamilton; "Cystic and Solid Ovarian Tumors in Children: A 44-Year Review," Surgical Section, American Academy of Pediatrics, Chicago; "Surgical Treatment of Gastro-intestinal Disorders," Refresher Course for gps and Pediatricians, Hospital for Sick Children, Toronto; "Cystic and Solid Ovarian Tumors in Children," Surgical Section, Alumni Association of the Hospital for Sick Children, Toronto; "Intussusception: 354 Cases in Ten Years," Paediatric Surgical Section, Royal College of Physicians and Surgeons of Canada.

DR. R.E. FALK, "The Effect of Antisera to Supernatants Containing Migration Inhibition Factor on Homograft Survival," Scandinavian Society for Immunology; "The Production of Lymphocyte Activating Factors by Sensitized and Non-sensitized Human Lymphocytes," British Society for Immunology; "Reactivity of Sensitized and Non-sensitized Thymocytes to Antigen as Measured by Inhibition of Migration of Thymocytes," Royal College of Physicians and Surgeons of Canada; "A Comparison of the Immuno-suppressive Action of ATS, Spleen Cell Absorbed ATS, and Antisera Prepared Against Migration Inhibition Factor" and "The Increased Reactivity of Human Lymphocytes to Streptococcal Antigens in Chronic Glomerulonephritis," American Federation of Clinical Research.

DR. J.F.R. FLEMING, "Angiographic Assessment of Carotid Endarterectomy," American Association of Neurological Surgeons.

DR. B.S. GOLDMAN, "Pathogenesis of Canine Cardiac Allograft Rejection," Second International Symposium on Heart Transplantation, Montreal; "The Effect of Glucagon on Total Coronary Blood Flow," Canadian Cardiovascular Society; "The Contribution of Internal Mammary Implant, Total Coronary Blood Flow and Left Ventricular Function," Canadian Cardiovascular Society; "Functional, Metabolic and Histologic Effects of Anoxic Cardiac Arrest," Royal College of Physicians and Surgeons of Canada; "Permanent Transvenous Pacemakers: Indications, Complications and Management," Royal College of Physicians and Surgeons of Canada and American Geriatric Society; "Histological and Immunologic Features of Rejection in Canine Cardiac Allografts," Canadian Society for Clinical Investigation; "Pathogenesis of Canine Cardiac Allograft Rejection," American Heart Association.

DR. J.E. HALL, "Fractures in Children," American Academy of Orthopedic Surgeons.

DR. W.R. HARRIS, "Management of Open Fractures," American College of Surgeons; "Management of Industrial Amputations," International Society of Rehabilitation for the Disabled; "The Results of Charnley's Total Hip Arthroplasty" and "The Use of Methyl Methacrylate Cement," Committee of Prosthetic Research and Development, National Academy of Sciences, Washington; "Total Hip Arthroplasty Using Charnley's Technique," Society of Graduate Orthopedic Surgeons, University of California at Los Angeles.

DR. D.E. HASTINGS, "Surgery of the Rheumatoid Hand," Inter-Urban Arthritis Meeting, Pittsburgh.

DR. R.O. HEIMBECKER, "The Fresh Homograft Valve," National Institutes of Health Tissue Valve Conference, California; "Papillary Muscle Dysfunction and Myocardial Infarct Excision," American College of Surgeons Postgraduate Course in Cardiovascular Surgery; "Surgical Complications of Myocardial Infarction" and "Mechanical Assistance to the Failing Heart," American College of Cardiology; "Surgery for Coronary Artery Disease," Queen's University, Aesculapian Club; "Massive

Pulmonary Embolism" and "Surgery for Massive Myocardial Infarction," University of Miami; "Microcirculation and Hemodynamic Changes in Decompression Sickness," University of Toronto Research Seminar; "Surgery for Ventricular Aneurysm," Utah Heart Association and American College of Physicians with Utah Society of Internal Medicine; "Massive Pulmonary Embolism," University of Utah Department of Surgery; "The Present Status of Pacemakers" and "Surgery for Acute Myocardial Infarction," Utah Heart Association Annual Scientific Session; "Surgery for Massive Myocardial Infarction," New York Society for Cardiovascular Surgery; "The Present Status of Myocardial Revascularization Techniques," University of New York Down State Medical Center; "Experimental Myocardial Infarction and Infarctectomy," Joint Meeting, Society of University Surgeons, European Surgical Research Society, and British Surgical Research Society, Royal College of Surgeons, London, England; "Surgery for Ventricular Aneurysm" and "Surgery for Coronary Artery Disease and Its Complications," Royal Infirmary, Edinburgh; "Surgical Treatment of Coronary Artery Disease," Southern General Hospital, Glasgow; "Modern Surgical Management of Massive Pulmonary Embolism" and "A New Look at Decompression Sickness," University of Newcastle-upon-Tyne; "Surgical Treatment of Ventricular Aneurysm," "Experimental Myocardial Infarction and Infarctectomy" and "Hemodynamic Changes in Decompression Sickness," Department of Cardiovascular Surgery, Utrecht.

DR. H.J. HOFFMAN, "Optic Canal Tomography," American Association of Neurological Surgeons; "The Child with Spina Bifida," Ontario Society for Crippled Children Nursing Staff Conference, Toronto.

DR. A.R. HUDSON, "Ultrastructural Changes in the Proximal Stump of a Severed Peripheral Nerve," Royal College of Physicians and Surgeons of Canada, Montreal.

DR. R.W. JACKSON, Addresses on the subject of Arthroscopy given at: Iowa State University, September 26, 1969; Syracuse University, December 2, 1969; Duke University, December 8, 1969; Chapel Hill, North Carolina, December 9, 1969; Harvard Medical School, December 31, 1969.

DR. J.P. KOSTUIK, "High Tibial Osteotomy for Osteoarthritis of the Knee," Canadian Orthopaedic Association; "Orthopaedic Impressions in Northern Europe and the Soviet Union" and "The Treatment of Osteomyelitis Complicating Femoral Shaft Fractures," Toronto General Hospital Surgical Staff, and Dewar Orthopaedic Club; "The Effect of Varus and Valgus Angulation on Weight Transmission through the Knee Joint," Canadian Orthopaedic Research Society, and Toronto Academy of Medicine Orthopaedic Section; "The Biomechanical Rationale of Osteotomy in the Treatment of Osteoarthritis of the Knee," University of Toronto Clinical Research Society.

DR. I.H. KOVEN, "A Direct Study of the Interstitial Phase of Extracellular Fluid," Royal College of Physicians and Surgeons of Canada, Montreal; "Studies on the Transport Characteristics of Interstitial Fluid during Low Capillary Flow States," Clinical Research Society of Toronto.

DR. K.E. LIVINGSTON, "A Reorientation of the Limbic System," Neurosurgical Society of America; "A Proposed Reorientation of the Limbic System (Limbus)," Society of Neurological Surgeons, Boston; "Central Modulation of Visceral Homeostatic Mechanisms: A Contribution to Limbic Theory," University of Mexico Department of Biomedical Investigation; "The Central Modulation of the Baroreceptor-Vagal Reflex," University of California at San Diego Department of Medicine Cardiovascular Study Group.

DR. I. MACNAB, "The Laminectomy Membrane," Canadian Orthopaedic Association; "Auto Immune Responses in Rotator Cuff Tendinitis," American Orthopedic Association; "Tendon Degeneration," Detroit Academy of Orthopedic Surgery.

DR. L.J. MAHONEY, "The Use of Intra-arterial Infusion Chemotherapy in the Treatment of Malignant Disease," Department of Radiotherapy and Nuclear Medicine, General Hospital, Kuala Lumpur, Malaysia.

DR. R.E. MATHEWS, "Evaluation of Radiosulphate as a Measure of Functional and Total Extracellular Fluid" and "Sulphur-35 Measurements of Functional and

Total Extracellular Fluid in Dogs with Hemorrhagic Shock," American College of Surgeons Clinical Congress, San Francisco.

DR. J.A. MCINTYRE, "Radiographic Identification of Abnormal Position of cvp Catheters" and "Rotations of the Stomach," Royal College of Physicians and Surgeons of Canada, Montreal; "The Use of the Long Intestinal Tube," American College of Surgeons, San Francisco.

DR. T.P. MORLEY, "Air Embolism in Neurosurgical Operations," American Association of Neurological Surgeons.

DR. F.G. PEARSON, "Experience with the Cytologic Detection and Management of Radiographically Undemonstrable Bronchial Carcinoma" and "Gastroplasty and Belsey Hiatus Hernia Repair for the Management of Peptic Stricture with Acquired Short Esophagus," University of California at Los Angeles, Harbor General Hospital; "Complications of Tracheal Cuffs," Paediatric Intensive Care Conference, Hospital for Sick Children, Toronto; "Surgical Aspects of Chest Trauma," Refresher Course for Radiologists, St. Michael's Hospital, Toronto; "The Incidence and Pathogenesis of Tracheal Injury Following Cuffed Tube Tracheostomy with Assisted Ventilation" and "Gastroplasty: An Operation for the Management of Peptic Stricture with Acquired Short Esophagus," Royal College of Physicians and Surgeons of Canada, Montreal; "Gastroplasty and Belsey Hiatus Hernia Repair: An Operation for the Management of Peptic Stricture with Acquired Short Esophagus," American Association for Thoracic Surgery, Washington.

DR. J.L. PROVAN, "The Management of Venous Thrombosis," University of Toronto Refresher Course for General Surgeons; "Scintillation Scanning of Lungs in the Management of Carcinoma of Bronchus," Tenth International Cancer Congress, Houston.

DR. M. RANG, "Fractures of the Upper Limb in Children," American Society of Roentgenologists, Chicago.

DR. J.T. RANKIN, "The Management of Urinary Infection," Riverdale Hospital; "Hydrodynamics of Micturition," Toronto Society of Nephrology.

DR. I.B. ROSEN, "Parotid Swelling," University of Toronto Postgraduate Courses for General Surgeons.

DR. R.B. SALTER, "First Ten Years Personal Experience with Innominate Osteotomy in the Treatment of Congenital Dislocation and Subluxation of the Hip," Combined Orthopaedic Associations of the English-Speaking World, Sydney, Australia; "The Epiphyseal Plate," American Academy of Orthopedic Surgeons, Chicago and Buffalo; "The Differential Diagnosis of Limp in Childhood," Royal College of Physicians and Surgeons of Canada, Montreal.

DR. J. SCHATZKER, "The Degenerative Changes of the Lumbar Spine with Aging," International Society of Orthopaedic Traumatology Surgeons, Mexico City.

DR. B. SHANDLING, "Hiatal Hernia in Infants and Children," Royal College of Physicians and Surgeons of Canada, Montreal; "H-Type Tracheo-Oesophageal Fistula," American Academy of Pediatrics, Surgical Section.

DR. E.H. SIMMONS, "Surgery of the Cervical Spine - Anterior Cervical Discectomy and Fusion," Royal Society of Medicine, London, England; "The Surgical Correction of Flexion Deformity of the Cervical Spine in Ankylosing Spondylitis," American Academy of Orthopedic Surgeons, Chicago; "Soft Tissue Injuries of the Cervical Spine in Relation to Shoulder Pain" and "Injuries of the Acromioclavicular Joint," American Academy of Orthopedic Surgeons Post-Graduate Course on Sports Medicine, Buffalo; "A Biomedical and Clinical Study of Anterior Spinal Instrumentation," Scoliosis Research Society, Los Angeles; "Experiences with Anterior Cervical Fusion" and "Atlanto-axial Arthrodesis," Spinal Symposium, Australia; "The Surgical Correction of Flexion Deformity of the Cervical Spine in Ankylosing Spondylitis," Fifth Combined Meeting of Orthopaedic Associations of America, Canada, Britain, Australia, New Zealand and South Africa, Sydney, Australia; "Acromioclavicular Dislocation," University of Toronto Post-Graduate Course on Fractures and Joint Trauma; "Anaesthesia in Spinal Surgery," Dewar Orthopaedic Club.

DR. R.R. TASKER, "Thalamic Mapping as a Means of Lesion Localization during Stereotactic Procedures of the Relief of Pain," IVth International Congress of Neurological Surgery Symposium on Pain; "The Human Auditory Thalamus" and "Thalamotomy for Pain," North Pacific Society for Neurology and Psychiatry.

DR. C.H. TATOR, "Permeability in Brain Tumours," International Society for Neurochemistry, Milan.

DR. G.A. TRUSLER, "Palliative Procedures in Transposition of the Great Vessels," Ontario Heart Foundation Symposium; "Surgical Treatment of Vascular Compression," Post-Graduate Course Conference on Paediatric Broncho-Oesophagology, Toronto Hospital for Sick Children; "Surgical Management of Pulmonary Atresia with Intact Ventricular Septum," American Heart Association, Dallas.

DR. R.G. VANDERLINDEN, "The Surgical Treatment of Epilepsy," Neurological Refresher Course Symposium on Epilepsy, Toronto Western Hospital; "The Neurophysiology of Pain," Neurological and Neurosurgical Post-Graduate Course, University of Toronto; "Cauda Equina Compression due to Lumbar Disc Protrusion," Royal College of Physicians and Surgeons of Canada, Montreal; "The Surgical Management of Intractable Pain," Toronto Western Hospital Clinical Day Reunion.

DR. A.M. WILEY, "Osteoarthritis of the Knee - Rationale for Treatment," American Academy of Orthopedic Surgeons, Chicago; "Ski Pole Injuries," British Orthopaedic Association Special Conference on Ski Injuries, Austria.

DR. W. Zingg, "Abnormal Biorheology of Blood in Diabetic Children," Canadian Cardiovascular Society; "The Impact of Science on Surgery," International Orthopaedic Club.

PUBLICATIONS

- BAIRD, R.J. "The Reasons for Patency and Anastomosis Formation of the Internal Mammary Artery Implant" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 1, 1969, pp. 172-90).
- BAIRD, R.J. and MANKTELOW, R.T. "A Practical Approach to Accurate Measurements" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 58, 1969, pp. 122-7).
- BAIRD, R.J., MANKTELOW, R.T. and SHAH, P.A. "The Pressure in a Vascular Implant in the Myocardium during Systole" (*Circulation*, Supp. 1, vol. 40, 1969, pp. 75-81).
- BARKIN, M. "The Female Bladder Neck and Urethra"; in *Pediatric Urology*, ed. D. Innes Williams, pp. 228-30.
- BIGELOW, W.G. "Surgery of Coronary Heart Disease" (*Annals of the Royal College of Surgeons of England*, vol. 44, 1969, pp. 140-52).
- BIGELOW, W.G., WILSON, D.R. and BAKER, C.B. "Heart Transplantation, University of Toronto" (*Laval Médical*, vol. 41, 1970, pp. 170-3).
- BIRCH, J.R. *A Review of the Literature on Burns and Trauma* (Sept. 1967 to Aug. 1968). Ottawa: Defence Research Board, Department of National Defence, Canada, 1969. (Monograph).
- BIRCH, J.R. and BRANEMARK, P-I. "The Vascularization of a Free Full Thickness Skin Graft. Part I" (*Scandinavian Journal of Plastic Surgery*, vol. 3, 1969, pp. 1-10).
- BIRCH, J.R., BRANEMARK, P-I. and LUNDSKOG, J. "The Vascularization of a Free Full Thickness Skin Graft. Part II" (*Scandinavian Journal of Plastic Surgery*, vol. 3, 1969, pp. 11-17).
- BIRCH, J.R., BRANEMARK, P-I., NILSSON, K. and LUNDSKOG, J. "Vascular Reactions in an Experimental Burn studied with Infrared Thermography and Microangiography" (*Scandinavian Journal of Plastic Surgery*, vol. 2, 1968, pp. 97-103).
- COLAPINTO, V. "Two-stage Urethroplasty for Stricture: Results and Technical Considerations" (*British Journal of Urology*, vol. 41, 1969, pp. 494-504).
- CURRIE, D.J., MCKENNA, J.P., MACDONALD, J.A., MAHONEY, L.J., FINLAYSON, D.C. and LANSKAIL, J.C. "The Use of Continuous Postoperative Peritoneal Lavage in the Management of Diffuse Peritonitis" (*Surgery, Gynecology and Obstetrics*, vol. 130, 1970, pp. 254-8).
- DELARUE, N.C. "The Challenge of Breast Cancer: Time for Reappraisal of Management. A, Emphasis on Early Diagnosis and Prompt Treatment; B, Emphasis on Individualization of Treatment" (*Applied Therapeutics*, vol. 11, 1969, pp. 381-6; 430-5).
- "Down with Drowning: The Canadian Red Cross Water Safety Service for Canadians from Coast to Coast" (*Despatch*, vol. 31, 1970, pp. 2-15).
- "The Reasons for an Anti-Smoking Campaign: A Challenge for Adult Commitment" (*The Business Quarterly*, vol. 35, 1970, pp. 87-97).

- "Should Hospitals Ban Sale of Cigarettes?" (*Hospital Administration in Canada*, vol. 12, 1970, p. 45).
- DELARUE, N.C., ANDERSON, W.D. and STARR, J. "Modified Radical Mastectomy in the Individualised Treatment of Breast Carcinoma" (*Surgery, Gynecology and Obstetrics*, vol. 129, 1969, pp. 79–88).
- DELARUE, N.C., SALTI, I., RUSE, J.L., STIEFEL, M. and LAIDLAW, J.C. "Non-tumorous Primary Aldosteronism: II, Type Not Relieved by Glucocorticoid" (*Canadian Medical Association Journal*, vol. 101, 1969, pp. 11–16).
- DRUCKER, W.R., HAIST, R.E. *et al.* "Influence of Infused Glucose on Insulin Response during Hypovolemic Shock" (*Federation Proceedings*, vol. 28, 1969, p. 507).
- "Insulin Response during Hypovolemic Shock" (*Surgery*, vol. 66, 1969, pp. 80–8).
- "Role of Catecholamines in Energy Metabolism during Prolonged Hemorrhagic Shock" (*Surgical Forum*, vol. 20, 1969, pp. 9–11).
- EIN, S.H. "Silon Sheeting in the Staged Repair of Massive Ventral Hernias in Children" (*Canadian Journal of Surgery*, vol. 13, 1970, pp. 127–34).
- EVANS, R.J. "Intractable Pain in Advanced Malignancy" (*Excerpta Medica International Congress*, Series no. 193, no. 352, 1969, p. 125).
- FALK, R.E. *et al.* "Hyper-acute Cortical Necrosis after Antibody Pretreatment of Synergeneic Rat Kidney Transplants" (*Scandinavian Journal of Urology and Nephrology*, vol. 4, 1970, pp. 58–65).
- "In vitro Correlates of Transplantation Immunity: The Release of Substances by Immune Lymphocytes confronted with Specific Antigens" (*Surgery*, vol. 66, 1969, pp. 51–7).
- "Lymphocytic Responses to Streptococcal Antigens in Glomerulonephritic Patients" (*Science*, vol. 168, no. 3935, May 1970, pp. 1105–8).
- "Release of Migration Inhibitory Factors from Immune Rat Lymphocytes confronted with Histocompatibility Antigens" (*Nature*, vol. 224, no. 5225, 1969, pp. 1206–7).
- FALK, R.E. and FALK, J.A. "Reactivity of Sensitized and Non-sensitized Thymocytes to Antigen as measured by Inhibition of Migration of Thymocytes" (*Abstracts, Royal College of Physicians and Surgeons of Canada*, vol. 2, 1970, p. 29).
- FALK, R.E., STONE, R.M. and LANGER, B. "A Comparison of the Immuno-suppressive Action of ATS, Spleen Cell Absorbed ATS, and Antisera prepared Migration Inhibition Factor" (*Clinical Research*, vol. 17, Dec. 1969, p. 604) (abstract).
- FALK, R.E. and ZABRISKIE, J. "The Increased Reactivity of Human Lymphocytes to Streptococcal Antigens in Chronic Glomerulonephritis" (*Federation Proceedings*, vol. 29, April 1970, p. 306) (abstract).
- "The Increased Reactivity of Human Lymphocytes to Streptococcal Antigens in Chronic Glomerulonephritis and Rheumatic Heart Disease" (*Clinical Research*, vol. 18, 1970, p. 424).
- FLEMING, J.F.R. *et al.* "Arteriographic Assessment of Carotid Endarterectomy" (*Annals of Surgery*, vol. 171, 1970, pp. 509–21).
- "The Lumbar Disc Syndrome produced by Sacral Metastases" (*Canadian Journal of Surgery*, vol. 13, 1970, pp. 149–56).
- FLEMING, J.F.R., BAKER, E.F.W. *et al.* "A New Look at Bimedial Prefrontal Leukotomy" (*Canadian Medical Association Journal*, vol. 102, Jan. 1970, pp. 37–41).
- GALE, G.L. and DELARUE, N.C. "Surgical History of Pulmonary Tuberculosis: The Rise and Fall of Various Technical Procedures" (*Canadian Journal of Surgery*, vol. 12, 1969, pp. 381–8).
- GOLDMAN, B.S., SHEVERINI, M.A. and GORMAN, C.K. "Effect of Glucagon on Total Coronary Blood Flow" (*Circulation*, Supp. 3, 1969, p. 91).
- GOLDMAN, B.S., SILVER, M.A., BIGELOW, W.G., CROOKSTON, J.H. and SHUMAK, K.H. "Antibody in Cardiac Rejection" (*New England Journal of Medicine*, vol. 282, 1970, p. 515).
- GOLDMAN, B.S., SILVER, M.A. and SHUMAK, K.H. "Pathogenesis of Rejection of Canine Cardiac Allografts" (*Circulation*, Supp. 3, 1969, p. 187).
- HARRIS, W.R. "Growth Stimulation" and "Transportation of Growth Plates"; in *The Growth Plate and Its Disorders*, ed. M. Rang, pp. 167–70. Edinburgh: E. & S. Livingstone, 1969.
- HARRIS, W.R. and KOSTIUK, J.P. "High Tibial Osteotomy for Osteoarthritis of the Knee" (*Journal of Bone and Joint Surgery*, vol. 52A, 1970, pp. 330–6).
- HASTINGS, D.E. "The Surgery of Rheumatoid Arthritis" (*Modern Medicine of Canada*, vol. 25, 1970, pp. 34–43).
- HASTINGS, D.E. (with Drummond, D.) "Dislocation of the Cuboid" (*Journal of Bone and Joint Surgery*, vol. 52, 1969, pp. 716–18).
- HEIMBECKER, R.O. "Infarct Resection" (*American Heart Association*, Monograph 27, 1969, pp. 334–9).
- "Myocardial Infarctectomy" (*Circulation*, Supp. 4, 1969, pp. 334–9).
- "Papillary Muscle Dysfunction and Resection of Myocardial Infarction" (*American College of Surgeons Congress*, 1969, pp. 37–40).
- "Whither the Homograft Valve?" (*Annals of Thoracic Surgery*, vol. 9, 1970, pp. 487–9).
- HEIMBECKER, R.O. *et al.* "The Training of a Surgeon" (*British Journal of Hospital Practice*, 1970, pp. 129–35).

- HENDERSON, R.D. *et al.* "The Functional Morphology of the Pulmonary Circulation"; in *The Pulmonary Circulation and Interstitial Space*, ed. A.P. Fishman and H.H. Hecht, pp. 327-40. Chicago: University of Chicago Press, 1969.
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- JOYNT, G.H.C. "The Side Effects of Carcinoma of the Lung" (*Ontario Medical Review*, vol. 36, 1969, p. 413).
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- "Pain and Disability in Degenerative Disc Disease" (*Texas Medicine*, vol. 65, Nov. 1969, pp. 56-63).
- "Rehabilitation of the Low Back Cripple" (*Proceedings of the International Seminar on Rehabilitation Programmes in Workmen's Compensation and Related Fields*, Toronto, 1969).
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- "Anterio Occipito-cervical Fusion using an Extra Phalangeal Exposure" (*Journal of Bone and Joint Surgery*, vol. 51A, 1969, pp. 1621-6).
- MACNAB, I. and DALL, D. "Recurrent Anterior Dislocation of the Hip" (*Journal of Bone and Joint Surgery*, vol. 52A, 1970, pp. 574-6).
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